FEDERAL SIGNAL
Safety and Security Systems

DCB, DCFCB, and DCFCTB Models

Battery Operated
2001 Siren Control System
with Federal Controller,
One-Way and Two-Way Series B (FCT)

Installation, Operation, and Service Manual

255360
Rev. J6 1014
Printed in U.S.A.
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The Alerting and Notification Systems Division of **Federal Signal Corporation (Federal)** warrants each new product to be free from defects in material and workmanship, under normal use and service, for a period of two years on parts replacement and factory-performed labor (one year for Informer, EAS, and Federal software products) from the date of delivery to the first user-purchaser. Federal warrants every 2001, Eclipse and 508 Siren (Top of pole only) to be free from defects in material, per our standard warranty, under normal use and service for a period of five years on parts replacement.

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2645 Federal Signal Drive, University Park, IL 60484-3167
Phone: 800-524-3021
E-mail: techsupport-ans@federalsignal.com
Website: http://www.alertnotification.com

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Safety Message

⚠ WARNING

It is important to follow all instructions shipped with this product. This device is to be installed by trained personnel who are thoroughly familiar with the country electric codes and will follow these guidelines as well as local codes.

Listed below are important safety instructions and precautions you should follow:

Important Notice

Federal Signal reserves the right to make changes to devices and specifications detailed in the manual at any time in order to improve reliability, function or design. The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for any inaccuracies.

Publications

Federal Signal recommends the following publications from the Federal Emergency Management Agency for assistance with planning an outdoor warning system:

- The "Outdoor Warning Guide" (CPG 1-17)
- "Civil Preparedness, Principles of Warning" (CPG 1-14)
- FEMA-REP-1, Appendix 3 (Nuclear Plant Guideline)
- FEMA-REP-10 (Nuclear Plant Guideline).

Planning

- If suitable warning equipment is not selected, the installation site for the siren is not selected properly or the siren is not installed properly, it may not produce the intended optimum audible warning. Follow Federal Emergency Management Agency (FEMA) recommendations.
- If sirens are not activated in a timely manner when an emergency condition exists, they cannot provide the intended audible warning. It is imperative that knowledgeable people, who are provided with the necessary information, are available at all times to authorize the activation of the sirens.
- When sirens are used out of doors, people indoors may not be able to hear the warning signals. Separate warning devices or procedures may be needed to effectively warn people indoors.

- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings, and restrict access to areas near sirens.
- Activating the sirens may not result in people taking the desired actions if those to be warned are not properly trained about the meaning of siren sounds. Siren users should follow FEMA recommendations and instruct those to be warned of correct actions to be taken.
- After installation, service, or maintenance, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service and operating personnel do not have these instructions to refer to, the siren system may not provide the intended audible warning and service personnel may be exposed to death, permanent hearing loss, or other bodily injury. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees. Also give a copy to anyone who is going to service or repair the siren.

Installation and Service

- Electrocution or severe personal injury can occur when performing various installation and service functions such as making electrical connections, drilling holes, or lifting equipment. Therefore only experienced electricians should install this product in accordance with national, state and any other electrical codes having jurisdiction. Perform all work under the direction of the installation or service crew safety foreman.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings and restrict access to areas near the sirens. Sirens may be operated from remote control points. Whenever possible, disconnect all siren power including batteries before working near the siren.
- After installation or service, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service personnel do not have these warnings and all other instructions shipped with the equipment to refer to, the siren system may not provide the intended audible warning and service personnel may be exposed to death, permanent hearing loss, or other bodily injury. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees. Also, give a copy to anyone who is going to service or repair the sirens.

Operation

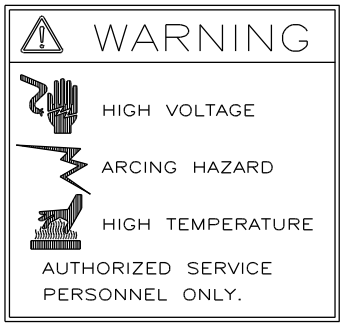
Failure to understand the capabilities and limitations of your siren system could result in permanent hearing loss, other serious injuries or death to persons too close to the sirens when you activate them or to those you need to warn. Carefully read and thoroughly understand all safety notices in this manual and all operations-related-items in all instruction manuals shipped with equipment. Thoroughly discuss all contingency plans with those responsible for warning people in your community, company, or jurisdiction.

⚠ WARNING

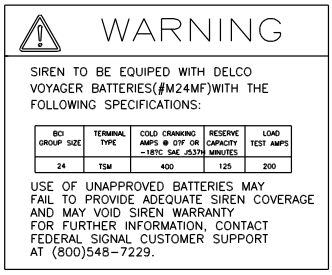
Read and understand the information contained in this manual before attempting to install or service the siren.

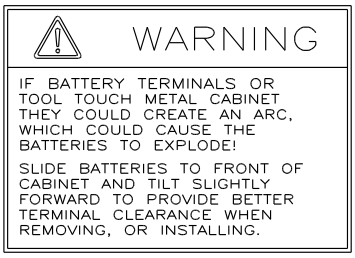
Pay careful attention to the following notices located on the equipment.

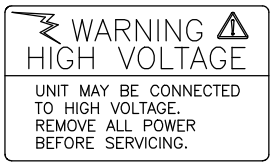
Notices—Externally Placed



Notices—Internally Placed


WARNING
SIREN TO BE EQUIPED WITH DELCO VOYAGER BATTERIES(#M24MF)WITH THE FOLLOWING SPECIFICATIONS:
BCI GROUP SIZE | TERMINAL TYPE | COLD CRANKING AMPS @ 0?F OR -18?C SAE J537H | RESERVE CAPACITY MINUTES | LOAD TEST AMPS
24 | TSM | 400 | 125 | 200
USE OF UNAPPROVED BATTERIES MAY FAIL TO PROVIDE ADEQUATE SIREN COVERAGE AND MAY VOID SIREN WARRANTY
FOR FURTHER INFORMATION, CONTACT FEDERAL SIGNAL CUSTOMER SUPPORT AT (800)548-7229.


WARNING
IF BATTERY TERMINALS OR TOOL TOUCH METAL CABINET THEY COULD CREATE AN ARC, WHICH COULD CAUSE THE BATTERIES TO EXPLODE!
SLIDE BATTERIES TO FRONT OF CABINET AND TILT SLIGHTLY FORWARD TO PROVIDE BETTER TERMINAL CLEARANCE WHEN REMOVING, OR INSTALLING.

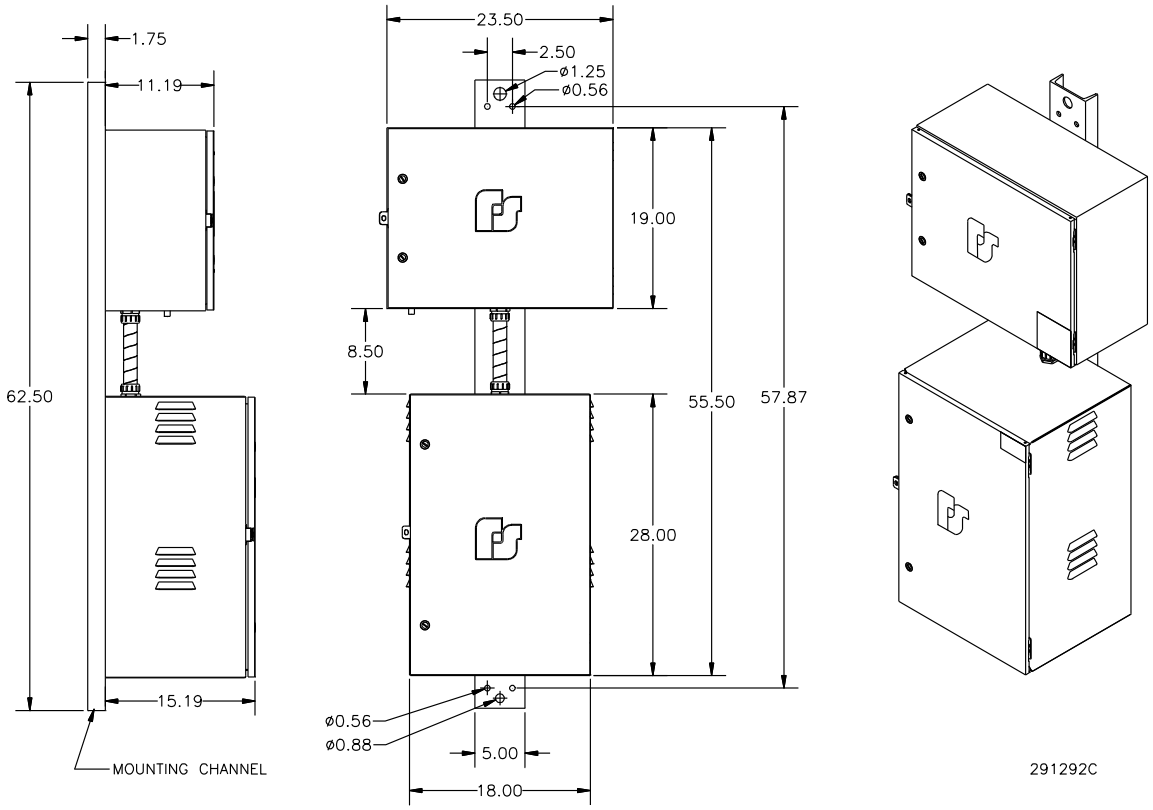


Characteristics

Scope of this Manual

This manual describes the characteristics, specifications, functional description, theory of operation, installation, and setup instructions for the controller and its sensors as well as the additional information required to operate, service, and maintain the control unit.

Figure 1 DCB, DCFCB, and DCFCTB Battery and Control Cabinets



Overview

The DCFCTB series Siren Control Systems contain the following components:

- 2001-130 siren controller with battery cabinet
- 48 VDC battery charging system
- Two-way communications controller with diagnostic sensors
- Radio transceiver (optional)

The DCB and DCFCB one-way series Siren Control Systems does not include two-way communications.

The antenna system is not included with the radio controller models. The appropriate directional or omni-directional antenna system must be ordered separately.

Control Unit/Battery Box

The Control Unit/Battery Box consists of two cabinets, which are channel mounted for ease of installation (refer to Figure 1 DCB, DCFCB, and DCFCTB Battery and Control Cabinets.) The upper NEMA 4 cabinet houses the necessary electronics and controls for producing the siren signals, and the charging system for the four 12 Volt batteries.

The lower vented NEMA 4 style enclosure houses four (4) user provided, maintenance free, lead-acid, deep-cycle, rechargeable batteries. The lower and upper cabinets are interconnected via Liquid-Tight conduit, which is sealed to prevent harmful vapors from entering the control area. The four batteries are connected in series to provide 48 VDC operating power to the siren, while the chargers in the upper cabinet operate on 120 VAC to keep the batteries charged. This arrangement continues to provide power to the siren in the event of a power failure. The controller works primarily off the AC input voltage. In the event of an AC power failure, the controller automatically obtains power from a 48 V to 12 V DC-to-DC converter powered by the four 12 V batteries.

DCFCTB Communications Controller

The DCFCTBs are two-way control and status monitoring siren controllers. The units interface to an off-the-shelf two-way radio transceiver and communicate to a base control unit via either DTMF or FSK signaling depending on the model purchased.

The controllers decode any combination of Single-Tone, Two-Tone Sequential, DTMF, EAS, POCSAG or FSK formats for activation. This makes the two-way controller compatible with virtually any existing siren control system.

The digital DCFCTBs provide the capability of digital encoding and decoding with added Security. Throughout this manual, all references to digital encoding, digital decoding, and FSK features and functions pertain only to the DCFCTBD series models. You can upgrade the DTMF version of the DCFCTB to the digital version DCFCTBD with a software update. All DCFCTB models come equipped with two useable relay outputs, which can be programmed independently to activate with various codes. Relay #3 is wired as a normally closed contact and is used to interrupt the 2001AC transformer during a growl test (if applicable). Relay #4 is reserved for a low voltage disconnect.

There are also four landline inputs and four local pushbuttons, which you can use to activate and cancel the unit.

The decode codes, relay timing and optional warning sounds are programmed into the unit through a standard RS232 serial port.

The DCFCTBs contain six user programmable functions in addition to the five preset functions: ARM, DISARM, REPORT, GROWL TEST, MASTER RESET.

The DCFCTBs come equipped with the necessary sensors and wiring to provide information on the following areas of operation:

- AC Power Status
- Communications Status
- Low Battery Voltage Indication
- Siren Activation Current
- Intrusion into Control Cabinet/Battery Cabinet
- Siren Rotation

The above information is returned in a Pass/Fail format. For example, if battery voltage is at proper operating level, then it is returned as "Battery Voltage OK." This status information is made available for viewing at the Central Control Unit. This reporting feature greatly improves warning system reliability by quickly alerting operating personnel to problems that are encountered.

The Integral LCD displays Function Counters, Decoded two-Tone, DTMF, POCSAG, MSK Digital functions decoded and the current Software Revision. The display constantly scrolls through the display items.

Two-Way Radio Control

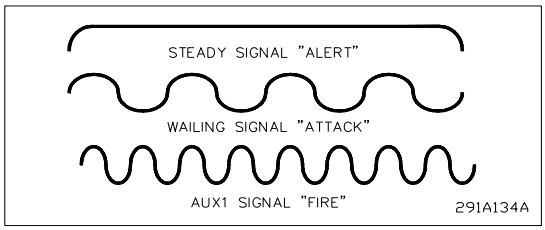
The Federal Signal DCFCTBs are available in VHF and UHF models transceivers to provide two-way signaling capabilities. Refer to the radio instruction manual for details concerning operation, specifications and maintenance. Consult Customer Care at (800) 548-7229 or Technical Support at (800) 524-3021 for specialized radio equipment needs.

DCB and DCFCB Communications Controller

The DCB and DCFCBs are one-way control and status monitoring siren controllers. They have ten separately fused circuits to protect the siren controller. Two AC power fuses (F1 and F2) protect the chargers and optional battery warmers respectively. The main siren motor is protected by a 200 amp DC fuse. An in line fuse connected to K1 fuses the rotator motor. The contactor coils are fused with in line fuses. The charger output wires are also individually protected with in line fuses (refer to Figure 11 DCB Wiring Diagram, Figure 12 DCFCB Wiring Diagram, and Figure 13 Battery Positioning and Wiring).

The Models DCB and DCFCB siren controllers are capable of producing a Steady signal, Wailing signal, and a Fast Wail or Fire signal. The Steady signal is frequently used as a Civil Defense “Alert” signal. The Wailing signal is often used as a Civil Defense “Attack” signal. The Fast Wail or Fire signal is often used to summon the local fire department. You can use any of the signals for any desired application. These signals are shown graphically in the following figure.

Figure 2 DCB and DCFCB Signal Characteristics



One-Way Radio Control

You can remotely activate the siren by a radio signal when an optional radio receiver/decoder is incorporated with the Control Unit/Battery Box. The advantage of radio control activation is that control lines are not required between the siren control site and the siren location. For units equipped with the optional integral radio receiver, the RF Frequency configuration parameter sets the frequency of the radio channel. Changing this parameter from its factory setting requires re-alignment of the radio for maximum performance. The value entered must fall within the range specified for the receiver band equipped.

Specifications

Specifications for the Controllers

Input Power Requirements

Input Power Requirements	
AC Voltage	120 +/- 10%, 50-60 Hz
Current draw	4.0 Amps at 120 VAC (nominal) 7 Amps with HTR2 or HTR4 option

AC Power and Battery Warmer Options

-240B: Step-down Battery Charger Transformer (Required when only 240VAC is available)	
Input Voltage	230 VAC single phase
Output Voltage	115 VAC (nominal)
Power Rating	0.75 KVA

2001TRB: AC Primary Operation	
Input Voltage	208/220/240 VAC single phase
Input Current	30 Amps (approx.)
Output Voltage	46 VDC/115 VAC (50 Amp service recommended, to be fused with 35 Amp Slo-Blow)
Output Current	120 Amps DC/10 Amps AC
Dimensions (H x W x D)	23 inches x 11 inches x 10 inches 584 mm x 279 mm x 254 mm
Weight	150 lb. (68.2 kg.)

HTR2 and HTR4: Battery Warmers	
Input Voltage	125 VAC single phase
Power Rating	80 Watts each

System Operating Power from the 4 Battery System

System Operating Power from the 4 Battery System	
Output Voltage	48 VDC (nominal)
Operating Current during an activation	115 Amps (nominal)
Continuous Full Output Signaling Time	20 minutes (minimum)
Stand-by time on Reserve Battery Capacity that provides a full 3-minute siren activation.	5 days minimum

Charging System and Recommended Batteries

Chargers (one per battery)	
Charger Output Voltage	13.50 VDC at 100 mA
Charger Output Current	4 Amps maximum

Recommended Batteries (user supplied)

Refer to Federal Signal Website (http://www.alertnotification.com/) for current recommended batteries. Use of batteries other than those specified may degrade the operation of this product and void the warranty.

Environmental

Environmental	
Operating Temperature	-30 to +65°C (with batteries maintained at -18°C minimum)

Dimensions

Dimensions (H x W x D)	
Control Cabinet (NEMA 4)	23.5 inches x 19 inches x 11.19 inches 597 mm x 483 mm x 284 mm
Battery Box (Vented NEMA 4)	18 inches x 28 inches x 15.19 inches 457 mm x 711 mm x 386 mm
Overall (including channel)	62.5 inches x 23.5 inches x 16.94 inches 1588 mm x 597 mm x 430 mm
Total Weight (including batteries)	364 pounds (165 kg.)
Shipping Weight (excluding batteries)	300 pounds (136 kg.)

Control Board Specifications

Input Power Requirements

AC Power	
AC supply voltage (switchable)	120 VAC +/- 10%, 50-60 Hz or 220 VAC +/- 10%, 50-60 Hz
Current draw	0.2A max.

Backup Battery	
DC Voltage	15 – 75 VDC
Current Draw	
with AC present	none
without AC (back up mode)	150 mA Standby (without 2-way radio)
with 2-way Radio	(Transceiver is 350 mA in Standby, 8 A transmit typical–refer to radio specifications for the actual radio model in use.)

Serial Communications

Serial Communications	
Serial Port Configuration	RS232C 1200,N,8,1

Signaling Format Specifications

Six (6) user programmable functions in addition to the five (5) preset functions: ARM, DISARM, REPORT, GROWL TEST, and MASTER RESET. Wildcard options for each of the DTMF strings.

Two Tone Sequential

Frequency range	282 Hz - 3000 Hz
Tone timing	1st Tone – 0.5 second minimum 2nd Tone – 0.25 second minimum 8 seconds maximum for both tones
Intertone Gap	400ms (maximum)
Tone Accuracy	+/- 1.5%
Tone Spacing	5.0% preferred, 3% minimum

Single Tone

Frequency range	282 Hz - 3000 Hz
Tone timing	0.5 second - 8 seconds maximum
Tone Accuracy	+/- 1.5%
Tone Spacing	5.0% preferred, 3% minimum

DTMF

All timing in milliseconds	
String length	3 - 12 standard DTMF characters
Mark/Space timing:	
Decoder Minimum	50 ms/50 ms (below 50/50 consult factory)
Decoder Maximum	800 ms total mark/space timing per function
Encoder	100ms/100ms mark/space timing
Space between Stacked codes, minimum	1.25 seconds

FSK

Baud rate	1200 bps
Modem type	MSK (minimal shift key)
Mark frequency	1200 Hz
Space frequency	1800 Hz
Error checking	16 bit CRC

EAS

Supports standard EAS codes and wildcards.

POCSAG

Supports Binary frequency shift keying 512 Baud numeric messages.

Inputs and Outputs

Relay Outputs

4 relay outputs	SPST (2 relays standard, 4 relays max.)
Contact Rating	5 A at 28 VDC and 240 VAC

Audio Output (Optional)

Output Voltage	>2 Vpeak to peak
Maximum Load	8 ohms
Total Harmonic Distortion	< 10% at 1 kHz Sinewave

Remote Activation Inputs

Quantity	4
Input Type	Dry contact closure <1 k ohm (Requires >1 second closure)

Transceiver Specifications

Programmable Frequency, Power Out, and Private Line options are available. For further details, consult the radio owner's manual.

Functional Description

System Operating Description

Siren Activation

The DTMF versions of DCFCTBs enable the user to program an ARM string into the controller for extra security. If an arm string is not programmed, then an ARM command is not required to activate a function. Digital versions of DCFCTBs do not use the ARM function.

Activation Using the ARM function

To start siren activation through the radio, it is necessary to ARM the siren before initiating a siren function; such as, a Wail or Steady. Once the siren is ARMed, it remains ARMed for 255 seconds or 4.25 minutes. Upon activation of the siren, it runs until the function times out, is canceled, or is reset. If the siren function is greater than 4.25 minutes, you must send another ARM command prior to sending a CANCEL command to shut off the siren. The ARM command is not required prior to sending a RESET command.

To start a function by either land line or pushbutton it is necessary to provide a one second closure on the landline or a one second depression of the pushbuttons.

Site Status Monitoring (DTMF only)

The siren controller will report when polled from the SS2000 or when one of its sensors changes state. The status of the site is encoded in a 9-digit DTMF string that is designed to work with a Federal Signal SS2000 to decode, format, and time and date stamp the received string. For detailed information about the DTMF coding format, refer to the Software Description of DCFCTB Encoding Format section on page 37.

Automatic Reports

The DCFCTB automatically sends back a report if one of the following sensors has a change of state: AC, Low Battery, Intrusion, Stuck Relay detected, Motor Fuse fail, or the siren is activated locally. The control station can also be set to automatically poll the system at a predefined interval. Automatic reporting may be optionally disabled on DCFCTBD systems. The DCFCTB is equipped with a carrier detect transmit hold off that causes the unit to wait until the channel is clear before an Automatic report is transmitted.

The thresholds are in the following table.

Input	Threshold	Time
AC fail internal	57 VAC +/- 5%	57 sec +/- 1
AC fail external TR	40 Vrms +/- 1%	2.2 sec + 1 sec x site #
Battery 12 V	12.7 V +/- 3%	20 sec
Battery 48 V	43.5 V +/- 3%	20 sec
Intrusion	Door Open	555 mS
Stuck Relay Detect	relays off & current = 50-300 A	222 mS
Motor fuse	1.0-3.4 V	5 sec
Local Activation	Push button	10 sec

Growl Test

The Standard Growl Test runs the rotator for 12 seconds and the chopper motor until the sensors latch or a maximum of 2 seconds. This function is commonly used when doing periodic testing to verify proper operation while generating minimal sound.

Control Cabinet Functional Descriptions

The DC Control cabinet has the following main parts:

- Motor Contactors
- Battery Chargers
- Power Distribution and fusing at the din rail
- Radio Transceiver (not included with DCB models)
- FCM Communications/Controller Board (not included with DCB models)

Motor Contactors

Two 200 Amp rated motor contactors are used for switching the 48 VDC power to the siren motor via K2, and the rotator motor via K1. The contactors are controlled by the relay outputs on the DCB, DCFCB and DCFCTB.

A third optional contactor, K3, is used to switch between the rectified 48 VDC provided by the 2001TRB option and the 48 VDC provided by the four (4) batteries in the battery cabinet. The switching occurs automatically when the 2001TRB power is lost.

The wiring to the siren and rotator motor is protected by a 200 Amp fuse.

Battery Chargers

Four chargers are used to independently charge each of the batteries in the battery box. The chargers are connected in series, as are the batteries to provide the 48VDC to the siren and rotator motors. Each charger has a built-in 7.5 Amp fuse, and charger wires are fused with 10 Amp fuses within the battery cabinets.

Power Distribution and Fusing at the Din Rail

The din rail is used to distribute and fuse various voltages. The following is a description of the terminals at the din rails:

Terminal	Description
TB1	
1	+12 VDC, from Charger 1
2	+24 VDC, from Charger 2
3	+36 VDC, from Charger 3
4	+48 VDC, from Charger 4

TB2	
1	Ground
2	Ground
3	Ground

TB3	
1	12 VDC from Converter
2	12 VDC from Converter

TB4	
1	48 VDC

TB5	
F1	10 Amp fuse for 120 VAC Neutral
F2	10 Amp fuse for 120 VAC Line
1	FUSED AC Neutral
2	FUSED AC Neutral
3	Ground
4	FUSED AC Line
5	FUSED AC Line

Radio Transceiver

When a radio option is purchased, the transceiver is factory installed, programmed and aligned to work with Federal Signal's DCFCTB. The 12 V transceiver is powered by the 48 V to 12V DC-to-DC converter. The converter is powered by the four 12 V batteries that continue to run the controller in case of a power failure. Consult the radio's operating manual for further operating details.

Communications/Controller Board

The Communications/Controller board is located on the backplane of the control cabinet. This board controls all functions of the DCFCB and DCFCTB. The board consists of seven main sections:

- Transceiver Interface
- Digital Inputs
- Relay Outputs
- Speaker Output
- Land Line and Local Pushbuttons
- Power Inputs and Power Supply
- Encoder and Decoder Sections

Communications/Controller Board Layout

ACFCTB Communications / Controller Board Layout

Refer to Figure 3 Communications/Controller Board Layout on page 24.

Reference	Description	Indication
D48	CPU LED	Microprocessor Heartbeat
D12	RECEIVE LED	RF Carrier Indicator on with carrier
D7	TRANSMIT LED	Transmit
D25	RELAYS ARMED	Power to relays on
D29	RELAY #1 LED	Relay #1 closed
D38	RELAY #2 LED	Relay #2 closed
D39	RELAY #3 LED	Relay #3 closed
D43	RELAY #4 LED	Relay #4 closed, or PA mode
D15	PRESSURE LED	Pressure Sensor input
D13	INTRUSION LED	Intrusion Sensor input
D18	CURRENT LED	Current Sensor input
D14	ROTATION LED	Rotation Sensor input
D16	LOW BATTERY LED	Low Battery Sensor (internal)
D17	AC POWER FAIL LED	AC Power Fail Sensor (internal)
D34	POWER LED	12 V Operating Power
D36	ISO 12V	Isolated 12V power
D34	ISO 5V	Isolated 5V power
U16	LCD Display	Displays Function Counters, Decodes and Software Revision

JP1	SINAD
1	Receiver module carrier detect, short to pin 2 when using SINAD board along with both sides of JP4 and remove D1.
2	External transceiver carrier detect.

JP2	Test Speaker
1	0 to 2 Vp-p, Audio Source: Receiver Audio during P.A. functions, Siren Audio during Electronic Siren functions.
2	Ground

JP3	Short For VOX Carrier Detect
1	Short to (JP3, pin 2), for VOX carrier detect.

JP4	Test Speaker
1	VCC, +5 V
2	VCC, +5 V
3	Short pins 1 and 3 to give priority to the external transceiver.
4	Short pins 2 and 4 to give priority to the internal receiver. With no shorting jumper, first carrier detect has priority. Short both sides when using SINAD board along with JP1.

JP5	Sensor Inputs (#1 at left edge)
1	Pressure sensor input, dry Contact closure < 1 K.
2	ISO Ground.
3	Intrusion sensor input, dry Contact closure < 1 K.
4	ISO Ground.
5	Current sensor input, dry Contact closure < 1 K.
6	ISO Ground.
7	Rotation sensor input, dry Contact closure < 1 K.
8	ISO Ground.
9	48 Volt Battery input to 48 Volt sensor and to power supply, 15–75 VDC.
10	Ground
11	12 Volt Battery input to 12 Volt sensor and to power supply, 11–15 VDC.
12	Ground

JP6	Speaker Mute gate bypass
	Short pins 1and2 to bypass speaker mute gate, allow monitoring of radio channel with local speaker

JP7	Receiver Module
1	Ground
2	+8 Volts DC, < 100 mA current.
3	Synthesizer programming Clock line, 0 to 5 Volt levels.
4	Synthesizer programming Data line, 0 to 5 Volt levels.
5	Synthesizer programming Latch line, 0 to 5 Volt levels.
6	Carrier Detect not line, goes low with carrier, 0 to 5 Volt levels.

JP7	Receiver Module
7	Receive Audio, De-emphasized, 700 to 900m Vp-p with 1 kHz tone at standard dev.
8	Receive Audio, Flat.

JP8	Serial and FLASH programming Port
1	
2	TXD, standard RS232 levels
3	RXD, standard RS232 levels.
4	Ground.
5	Processor Serial Clock, used during FLASH programming.
6	Processor Reset not, pulsed low (to Ground) during FLASH programming.

JP9	LEDs on with Intrusion
1	Short to pin 2, to disable LEDs when Intrusion switch is closed.

JP10	Remote Activation and Sensor Inputs (#1 at left edge of connector)
1	Spare Sensor Input #2, dry Contact closure < 1 K.
2	ISO Ground.
3	Spare Sensor Input #1, dry Contact closure < 1 K.
4	ISO Ground.
5	Remote Activation Input #4, Activates Functions under code 4, dry Contact closure < 1 K.
6	ISO Ground.
7	Remote Activation Input #3, Activates Functions under code 3, dry Contact closure < 1 K.
8	ISO Ground.
9	Remote Activation Input #2, Activates Functions under code 2, dry Contact closure < 1 K.
10	ISO Ground.
11	Remote Activation Input #1, Activates Functions under code 1, dry Contact closure < 1 K.
12	ISO Ground.

JP11	Emulation and Options Emulation
1	TCK
2	GND
3	TDO
4	VCC (+5V)
5	TMS
6	RESET NOT
7	VCC (+5V)
8	N.C.
9	TDI
10	GND

Options

Jumper pins 1 and 2 for Solar mode

For 2001 DC Solar mode

AC (Power)	AC Power and External Power or 50 VDC (AC power or 48 V battery/Charger) Latching
Battery	>12.7 v (DC-DC) AND >43.5 v (48 V battery)
Pressure	Motor fuse (low = pass)

For 2001 DC Non-Solar mode

AC (Power)	AC Power and External AC power (not looking at 48 VDC)
Battery	>12.7 v (DC-DC) AND >43.5 v (48 V battery) (either 12 or 48 fail will cause a fail) Transfer switch low voltage detect (External AC input Sense2, low=voltage pass)
Pressure	Motor fuse (low = pass)

For FCD Repeater Solar mode

AC (Power)	AC Power and External Power or 50 VDC (AC power or 48 V battery/Charger) Latching
Battery	12.7 VDC (connects to 12 V battery or DC-DC convertor)
Pressure	Charger = External charger sense contact (low = pass)

For FCD Repeater Non-Solar mode;

AC (Power)	AC and External Power or 50 VDC (AC power or 48 V battery/Charger) Latching
Battery	12.7 VDC (connects to 12 V battery or DC-DC convertor)
Pressure	Charger = External charger sense contact (low = pass)

Jumper pins 9 and 10 for Kenwood/TR Monitor and Control mode

When the Kenwood mode is polled, the unit responds over the port which received the poll request only.

TR monitor and Control mode

For FCD2001 or FCD Eclipse types, relay #3 is used for TR Control and Remote AC power Sense is used to monitor TR voltage.

Remote AC power Sense debounce fixed at 4 seconds (normally 28 Sec).

Standby:

- If low voltage is detected close relay #3
- If low voltage is not detected open relay #3

Running a function:

- If low voltage is detected relay #3 closes for duration of function.
- If voltage changes to good while running a function relay remains closed for duration of function

If unit is not a FCD2001 or FCD Eclipse or JP11-9, 10 is not asserted relay #3 functions as programmed.

JP12	**SINAD**
1	Directly to processor pin #58 (ADC7).
2	Ground.

JP13	**CTCSS Encoder/Decoder**
1	Receive audio, not DC isolated, set to 1 Vp-p with 1 kHz tone at 3 kHz dev.
2	Ground.
3	+8 Volts DC, < 100 mA current.
4	Decode not & PTT line, low with decode, set low by processor during transmit.
5	Transmit audio, 0 to 2 Vp-p of Digital data or Tone.

JP14	**Force Carrier Detect**
1	Short to (JP14, pin 2), to force carrier detect on.
2	Ground.

JP15	**Short To Set Deviation**
1	Short to ISO Ground (JP15, pin 2), causes unit to transmit for setting deviation.
2	ISO Ground.

JP16	**I2C Port**
1	
2	I2C Data line, buffered.
3	I2C Clock line, buffered.
4	+12 Volts DC, 1 Amp max. current.
5	Ground
6	

JP17	Short to Test Relay Output #1
1	Short to pin 2, to engage Relay output #1.

JP18	Short to Test Relay Output #2
1	Short to pin 2, to engage Relay output #2.

JP19	Short to Test Relay Output #3
1	Short to pin 2, to engage Relay output #3.

JP20	Short to Test Relay Output #4
1	Short to pin 2, to engage Relay output #4.

JP21	Relay Outputs, 3 Amps, up to 240 VAC, (#1 at left edge of connector)
1	Relay 1, Common
2	Relay 1, N.O.
3	Relay 2, Common
4	Relay 2, N.O.
5	Relay 3, Common
6	Relay 3, N.O. or N.C., depending on jumper JU1
7	Relay 4, Common
8	Relay 4, N.O. or N.C., depending on jumper JU2

JP22	AC Power Input
1 and 2	120 or 240 VAC +/- 10%, 60 Hz

P1	Transceiver Interface
1	Transmit audio, DC isolated, 0 to 1 Vp-p
2	Receive audio, DC isolated, 350 mVp-p to 3 Vp-p
3	PTT not, goes low (<0.65 V) during transmit
4	Ground
5	+12 Volts DC, 100 mA max, 2 A with battery.
6	Carrier Detect not, set low (<0.65 V) during receive
7	No connection
8	Ground
9	Ground

TJ1	Test Jack
1	Ground
2	Reference (+4 V)
3	Receive Audio
4	VCC (+5 V)
5	+8 V

TJ1	Test Jack
6	+12 V
7	+17 V
8	

TJ2	Test Jack
1	Isolated +12 V
2	Isolated +5 V
3	Isolated Ground

TP1	Two-Tone Decoder, HighPass Filter Enable
	Goes high when processor is decoding a tone > 2100 Hz

TP2	Receive audio to Two-Tone Decoder
	Audio at last stage before two-tone comparator, 1 to 3 Vp-p.

TP3	Transmit audio
	0.1 to 3 Vp-p.

TP4	Receive audio from Two-Tone Decoder to processor
	Audio after two-tone comparator, square waves to processor, 0 to 5 Vp-p.

TP5	Voltage at 48 Volt Battery Input
	0 – 70 Volts = 0 – 5 Volts

TP6	Voltage at 12 Volt Battery Input
	0 – 20 Volts = 0 – 5 Volts

TP7	Two-Tone Decoder, LowPass Filter Enable
	Goes high when processor is decoding a tone < 400 Hz

TP8	Receive audio level set
	External transceiver receive audio set to 1Vpp using R48

TP9	RX Data
	Receive data from digital modem IC, 0 to 5 Volts.

TP10	DTMF Decoder STD
	Goes low whenever a DTMF digit is being decoded.

TP11	8 Volt Regulated power supply

TP12	5 Volt Regulated power supply

TP13	Incoming unregulated 17 Volt power supply

TP14	Ground

TP15	12 Volt Regulated power supply

TP16	Isolated +12 Volt Regulated power supply

TP17	Isolated +5 Volt Regulated power supply

TP18	Isolated Ground

S1	Local Activation #4
	Press and hold for ½ second, Activates Functions under code 4.

S2	Local Activation #1
	Press and hold for ½ second, Activates Functions under code 1.

S3	Local Activation #2
	Press and hold for ½ second, Activates Functions under code 2.

S4	Local Activation #3
	Press and hold for ½ second, Activates Functions under code 3.

S5	Processor Reset

S7	110 / 220 VAC Selector switch

R48	**External transceiver receive audio set to 1Vpp at TP8**

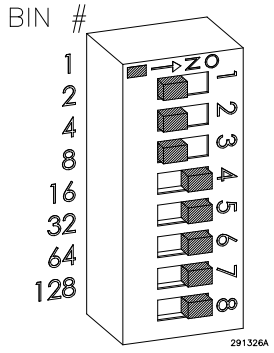
R61	**Test Speaker output level set**

R70	**MSK modem transmit deviation level set**

R71	**DTMF transmit deviation level set**

S6	**Site Address Switch**
	Sets units site number

Unit Address



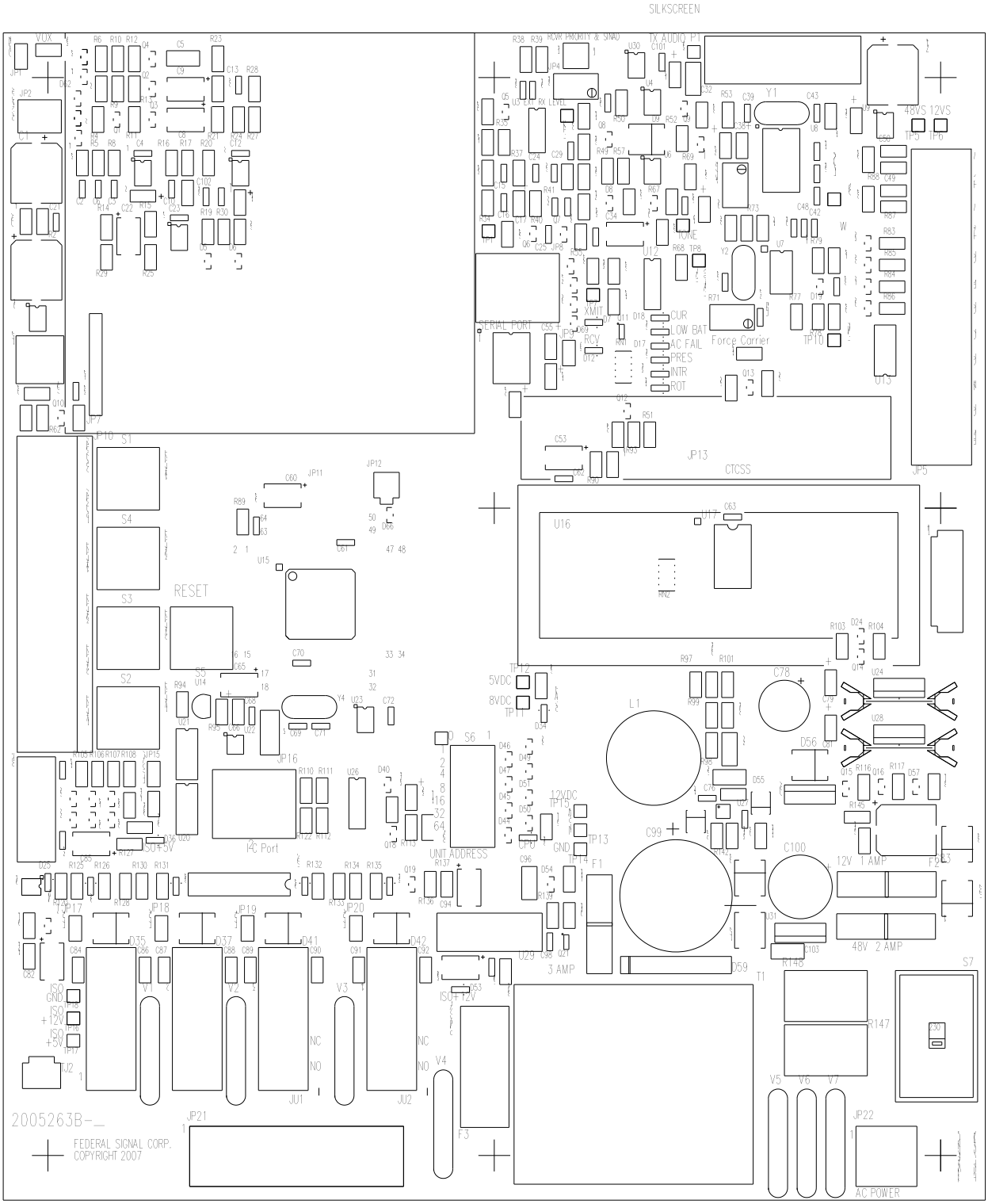
The unit address sets the siren site number and is used to identify the site in two-way report back systems. The unit address is a three-digit number with a range of 001-255. The unit address is set via dipswitch S1. S1 Off position indicates active position. Add binary active switch positions to get ID address.

Switch number	1	2	3	4	5	6	7	8
Binary number	1	2	4	8	16	32	64	128

Example: Switch number 1, 2 and 3 are binary numbers 1, 2 and 4, which when added would equal unit address 7.

NOTE: Must be set to address one to program controller board or to program a non-digital unit. When programming is completed, change dipswitch setting to actual site address. Programming details are in the software manual. The ID address is stored at power up of the controller. If the ID address is changed, the power (Battery and AC) must be turned off and then on.

Figure 3 Communications/Controller Board Layout

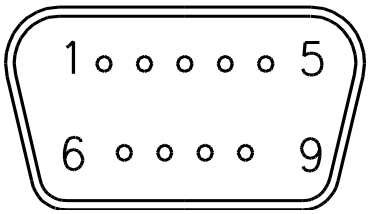


Transceiver Interface

A transceiver may be interfaced through the male DB9 connector, P1.

Position	Description
1	Transmit Audio
2	Receive Audio
3	PTT
4	Ground
5	12 VDC (unregulated)
6	Carrier Detect
7	Not used
8,9	Ground

Figure 4 Transceiver Interface Connector P1



Transmit Audio

You can adjust the encoded audio from 0 to 1.2 V_{p-p} (O.C.) using the DTMF Deviation Potentiometer, R71 and Digital Deviation Potentiometer, R70. This is used to set the audio output level to the transceiver. The transmit audio can be connected to the radio's line level (flat) audio input or its mic (pre-emphasized) audio input, but the flat or non-pre-emphasized input is preferred and is easier to adjust. The transmit deviation is adjusted as follows:

- DTMF – Adjust R71 for 3 kHz deviation (add .75 kHz deviation if CTCSS is used.)
- Digital – Adjust R70 for 3 kHz Deviation (do not exceed 4 kHz)

*__NOTE__: Deviation levels are cut in half when using 12.5 kHz channel spaced radios.

Receive Audio

Connect the receive audio to the radio's de-emphasized audio out. You can adjust the audio level of an external transceiver by R48 and when receiving a properly modulated signal as described above, adjust to 1 V_{p-p} at TP8.

PTT

Push-to-talk pulls to ground to place the transceiver into transmit mode.

+12 VDC

The +12 VDC is an unregulated, 1.0 Amp supply that can vary from 11.5 – 13.6 VDC.

Carrier Detect

Carrier Detect input requires a pull to ground to indicate when carrier is present.

Sensors and Sensor Inputs

The DCFCB and DCFCTB comes with the following inputs to work with external sensors and 2 built-in sensors to report the following conditions:

AC	JP22
AC (External Sensor Input)	JP10-1
Low Battery, 12 VDC	JP5-11
Low Battery, 48 VDC	JP5-9 (only used with 48 V type sirens.)
Rotation (Proximity Switch)	JP5-7
Rotation (Current Sensor)	JP10-3
Main Siren Motor Current	JP5-5
Intrusion	JP5-3

AC Sensor (built-in)

During normal operation (when AC is present) the built-in AC sensor does not light. If AC is lost, the AC LED lights. The AC sensing logic is dependent on both the built-in AC sense and the external AC sense points. If an AC loss is detected at either point, a report is sent. A loss of AC is not reported immediately. The controller makes sure the loss lasts at least 2 seconds then it adds (1 second * Site #) before reporting. Each siren with an AC failure reports by site number in sequential order with a two second delay between sites. Once AC is restored, another automatic report is sent in the same order to show change of state. If AC is restored before the automatic report is sent, the report is cancelled.

Low Battery Sensor (built-in)

The low battery sensor input measures the voltage across the four (4) series batteries. If the battery voltage goes below ~44 V for 20 seconds, the controller reports a low battery condition. The controller does not automatically report when the battery voltage returns to normal to eliminate the possibility of multiple reports when a battery is very weak. The low battery condition remains latched in memory until the controller is reset or a function is run and the battery voltage is restored.

Digital Inputs for Rotation Sensor

Two rotation sensor inputs exist. Depending on the sensor option purchased, either the current sensor or proximity switch input is used.

- Standard Rotation Sensor Input: JP10-3 is used for the rotation motor current sensor. This input latches when current is detected. During a siren rotation this input is pulled low. The latch is reset by the RESET command.
- Proximity Switch Rotation Sensor Input: JP5-7 is used to connect a proximity switch to detect siren rotation. You may leave this input unconnected if a non-rotating siren is used or if JP10-3 is used to detect rotation. During a normal siren activation (when the siren is rotating), the external rotation sensor, which is usually an open collector proximity device mounted in the siren to detect gear movement, provides active low pulses. Once this input receives more than 11 low pulses during a siren activation, this input will latch active until a reset command is received.

Digital Input for Current Sensor

JP5-5 is used to detect the main siren motor operating current during siren activation. This input is pulled low when the external current sensor detects proper running current during a siren activation. If this input is pulled low for 1/4 second, the input is latched active until another activation command is received or a Reset command is sent.

Digital Input for Intrusion Sensor

JP5-3 is used to detect an intrusion into the control cabinet. With the control cabinet closed, the intrusion switch is in a normally closed position. If the intrusion condition changes state for more than one second, an auto-report is sent.

Digital Input for Pressure Sensor (not used with 2001-130 sirens)

JP5-1 is used to detect blower pressure on Thunderbolt sirens during siren activation. This sensor input latches when operating current is detected (input is pulled low) and resets when a RESET command is received.

Relay Outputs

JP21	
Pin	**Out**
1	Relay 1, Common
2	Relay 1, N.O.
3	Relay 2, Common
4	Relay 2, N.O.
5	Relay 3, Common
6	Relay 3, N.O. or N.C., depending on jumper JU1, (N.C is standard)

JP21	
Pin	**Out**
7	Relay 4, Common
8	Relay 4, N.O. or N.C., depending on jumper JU2, (N.O. is standard)

There are four (4) relay outputs, which are controlled by the microprocessor. The relays provide isolation and are spike protected to prevent voltage spikes from affecting the unit. As the relay coil is energized, the outputs close and the associated LED lights. The DCFCB and DCFCTB come standard with two DPST relays. Relay #3 is reserved for a 2001AC disconnect option. Relay #4 is reserved for the low voltage cutoff feature.

Speaker Output

You can use the speaker output at JP2 to monitor received audio, route remote P.A. or provide signal out when the tone generator option is used. You can adjust speaker output up 2.0 V_{p-p} into an 8-Ohm load using R61.

Monitor Received Audio

When carrier is present, the received audio is routed to the test speaker output at JP2.

Remote Public Address

You need to program the P.A. as a function through the software if it is to be used. When the P.A. function is activated, the DCFCTB routes the received audio to the speaker output as long as carrier is detected. If the carrier drops out for more than 15 seconds, the unit goes back to standby mode.

Audio Function Generator Option

To use this feature, you need to program one of the standard signals or a custom signal through the software. When the audio function is activated, the audio from the function generator is routed to the speaker output until the function finishes or a cancel code is sent.

Landline and Local Pushbutton Activation

You can activate the first four (4) pre-programmed functions locally through the pushbuttons, on the DCFCTB PCB, or remotely by grounding one of the landline activation inputs at JP12 for at least one second. The remote inputs are protected by limiting diodes and cannot exceed 5.1 Volt. Each pushbutton is labeled with its associated function.

The remote inputs on JP10 are identified as follows:

JP10	Pin-out
Pin #1	EXTERNAL AC SENSOR INPUT
Pin #2	common
Pin #3	ROTATOR CURRENT SENSOR INPUT
Pin #4	common
Pin #5	FUNCTION #4
Pin #6	common
Pin #7	FUNCTION #3
Pin #8	common
Pin #9	FUNCTION #2
Pin #10	common
Pin #11	FUNCTION #1
Pin #12	common

Control Board Power Input

The controller has a 115 VAC power input. The DCFCB and DCFCTB may be ordered with the –240B option to enable operation from 208-240 VAC. The AC selection switch (S7) on the control board must **always** be set to the 110 VAC position. When the proper voltage is applied, the "POWER" LED is lit. Refer to the Installation section on page 49 for installation details.

DTMF Decoding and Encoding Formats

Decoding Format

DTMF

The DCFCTB decodes any valid 3 to 12 digit DTMF string with timing of 50/50 to a total mark/space time of 800 milliseconds. Faster DTMF decode timing, down to 35/5 ms, is available but you need to specify when ordered. When stacking multiple DTMF strings together, a 1250 millisecond spacing is needed before and after a valid DTMF string for proper decoding. Otherwise, the decoder disregards the string.

Two-Tone

The DCFCTB decodes two-tone codes with tone accuracy within 1.5%. Timing must be at least 80% of what has been programmed. The inter tone gap must be less than 400 milliseconds. The recommended minimum tone spacing is 5%. You can use tone timings between 0.5 seconds and 8 seconds for the A tone and between 0.25 seconds and 8 seconds for the B tone.

DTMF Encoding Format

The DCFCTB encodes a nine (9) digit DTMF string that includes the RTU's unit type, id number, function status and sensors status. Refer to the Software Description of DCFCTB Encoding Format section on page 37 for detailed information.

Theory of Operation

Control Board Theory of Operation

Description of DCFCTB Block Diagram

Power Supply Section

You can power the unit by either 110 VAC or 220 VAC (on JP22). The unit is protected by MOVs V5, V6 and V7, resistors R147 and R148 and by fuse F2. These absorb spikes and limit over-voltages. The power is stepped down by the transformer, rectified by D59 and filtered by C99. The voltage at this point is about 24 Volts DC. Transorb D61 blows fuse F1, if the voltage exceeds 30 VDC. This voltage is regulated to 12 VDC by switching regulator U27. This voltage turns on Q14 thru R104. The collector of Q14 sends a low to U22 pin 2 indicating the presence of AC Power.

U27 can also be powered by up to 75 Volts DC thru JP5 pin 9 from an external DC source. The 12VDC from U27 turns on Q15 thru R116. This pulls the gate of switch Q20 low allowing it to pass voltage from the 12 Volt battery thru Q20 to the rest of the board if needed due to a power failure. The passed battery voltage turns on Q16 thru R118 and Zener diode D57. Q16 also pulls the gate of Q20 low turning it on. If AC power fails, Q15 releases its low to Q20. Then if the battery voltage drops below about 9.6 VDC, Q16 releases its low to Q20. This turns off the power to the board; this stays off until AC power is restored.

U28 regulates the voltage further to 8 VDC and U24 regulates the voltage further to 5 VDC. An LED (D34) is also tied to this point and indicates power. U18 is an isolated DC to DC converter which converts the 12 Volt supply to an isolated 5 Volt supply. This is used for sensor and remote activation inputs. LED (D36) is also tied to this point and indicates isolated 5 Volt power. U29 is an isolated DC to DC converter which converts the 12 Volt supply to an isolated 12 Volt supply. This is used for relay outputs. LED (D53) is also tied to this point and indicates isolated 12 Volt power.

U14 monitors the voltage of the 5 Volt power. If the power supply voltage falls below 3.3 Volts, U14 resets the microprocessor.

CPU Section

The microprocessor section is comprised of the microprocessor (U15). This processor contains a watchdog timer, a day/date clock, non-volatile EEPROM and FLASH memory, I/O pins and A to D convertors. The EEPROM is the non-volatile memory where all customer specific information held while the FLASH is the non-volatile memory where the main program is held. One (1) allows the microprocessor to communicate over serial port JP8 for programming.

The unit contains an eight-position dipswitch for setting the unit's site address.

Remote Activation, Sensor and Battery Back-up Voltage Input Section

The remote activation inputs are available on connector JP10. Grounding any one of these pins activates the function associated with it. The inputs are protected by limiting diodes and optical-isolator IC U21. There is also a push-button on the board for each of these functions that activate the associated input.

The Sensor inputs are available on connectors JP10 and JP5.

Rotation, Intrusion, Pressure, Current, and Spare sensor inputs #1 and #2 are all active low (shorting to isolated ground). When one of these inputs is shorted to isolated ground the output of the associated optical-isolator pulls low. This is read by the processor. The 12 Volt, and 48 Volt sensor inputs are analog voltages that are buffered by U9 and then passed on the A to D convertors in the processor to be read. These are not optically isolated and are referenced to ground.

For an External Transceiver

The receive audio, from P1 pin 2 (the two-way connector) is routed to U3A the output of which is set to 1 V_{p-p} at TP8 using R48. The CTCSS decoder option, if installed, gates Q5 on and allows audio to pass. U3B forms a highpass filter. This strips out any audio frequencies below 300 hertz. This filtered audio is then fed to the various decoders.

For an Onboard One-Way Receiver

The receive audio enters the through R23 and C9 to Carrier Detect Gate Q2. The CTCSS decoder option, if installed, gates Q5 on and allows audio to pass. U3B forms a highpass filter. This strips out any audio frequencies below 300 hertz. This filtered audio is then fed to the various decoders.

Receiver Priority

Jumper JP4 sets the priority if an external transceiver and an on-board receiver are both used. The receiver with priority can interrupt the other receiver and its audio passes through to the rest of the circuits in the controller. The receiver with priority cannot be interrupted. If neither receiver is given priority then whichever receiver asserts carrier detect first will pass through and the other receiver will not be able to interrupt it.

If the "EXT" side is jumpered then the external transceiver has priority. When it asserts carrier detect the low passes through D3 and R10 turning on Q4. This allows the received audio to pass through Q4, C8 and R39 to the decoder circuits. The low also passes through R4 to Q1 which forces Q2 off preventing audio from the on-board receiver from coming through.

If the "INT" side is jumpered then the on-board receiver has priority. When it asserts carrier detect the low passes through D2 and R9 turning on Q2. This allows the received audio to pass through Q2, C8 and R39 to the decoder circuits. The low also passes through R11 to Q3 which forces Q4 off preventing audio from the external transceiver from coming through.

If both sides of JP4 are jumpered then the two receive audio signals are mixed together. This is done if the SINAD option is used as it allows receive audio from the external transceiver jack to pass through Q4 and Q2 back to the on-board receiver connector to feed the SINAD option board. JP1 must also be jumpered when the SINAD option is installed.

VOX

Receive audio is routed from the external transceiver connector to buffer amplifier U2A, which drives RMS to DC converter U5B. The DC voltage at the cathode of D6 represents the Level of the incoming receives audio. U5A acts as a comparator who's output pulls low when the receive audio exceeds about 45 mV_{p-p} or about 750 Hz of deviation (350 Hz for narrowband systems). This passes to JP3 which can be jumpered to provide VOX carrier detect for radios that do not provide carrier detect.

DTMF

Receive audio enters the DTMF decoder IC (U7) from the high pass filter thru C40 and R74. When a proper DTMF digit is being decoded, TP10 goes low and a binary output appears on pins 18, 19, 20, and 20 of U7.

Tone Decode

Receive audio from the high pass filter U3B, is passed on to low pass filter U3C. These form a band pass filter from 300 to 3000 Hz. When the processor is decoding a tone greater than 2100 Hz, it turns Q6 on. This makes the band pass filter from 1900 to 3000 Hz, which aids in the decoding of high frequency tones. When the processor is decoding a tone less than 500 Hz, it turns Q7 on. This makes the band pass filter from 300 to 500 Hz, which aids in the decoding of low frequency tones. After the band pass filter the tone is amplified by U3D then passed to U6B, a comparator that converts the tone to a square wave, and feeds it to the microprocessor to be measured. The square waves can be seen on TP4.

EAS Decode

Receive audio from the high pass filter U3B, is passed on to low pass filter U3C. When EAS functions are programmed, the processor turns Q2 on. These form a band pass filter from 300 to 3000 Hz. After the band pass filter the tones is amplified by U3D then passed to U6B, a comparator that converts the tone to a square wave, and feeds it to the microprocessor to be decoded. The square waves can be seen on TP4.

POCSAG Decode

All POCSAG messages contain a Receiver Identity Code (RIC) or CAP code. This indicates which unit or group of units a message is intended for. The unit must have its RIC configured before it responds to a message.

The Standard Format for Federal Signal POSAG codes consists of a five (5) character numeric message preceded by a bracket "[" and followed by a bracket "]" for a total of seven (7) characters. The first three (3) numbers are the unit number. Any unit number less than 300 activates only that unit number. A unit number of 300 activates all units. Unit number of 301 to 316 activates all units in zones 1 to zone 16 respectively. The unit must be configured for the zone in which it is to function.

The last two numbers in the message are the function number (01 through 06), which activates functions 1 through 6. Function numbers 96, 97, 98 and 99 activate Poll All, Reset, Quiet Test or Cancel respectively.

Receive audio from the receiver module enters on JP7, pin 8. This audio is direct coupled and passes through lowpass filter U1A. R18 and C7 average the DC voltage present on U1A pin 1 and pass it to U1B pin 6. U1B acts a comparator converting the audio present on pin 5 into squarewaves. This is fed to the processor for decoding.

Digital

The receive audio is fed to the digital decoder IC (U8). U8 converts the alternating tones in the digital code to a string of highs and lows forming serial data. The data is sent to the processor's RXD port to be decoded.

Encoder Section

The transmit audio is generated by U7 (the DTMF encoder), U8 (the digital encoder) and the CTCSS board (if present). PTT is generated by the processor taking pin 26 low. This gates Q9 on allowing the transmit audio to pass out to the transmitter.

The PTT also sets the output of U12F high, which allows R65 to turn on Q8 thru R49. Q8 pulls the PTT line low and activates TRANSMIT LED D7. U12F, being high, also allows R57 to begin charging C34. When this exceeds 5 volts, U6A forces its output to ground and shuts off Q8. This provides a time-out timer to prevent the transmitter from getting stuck in transmit.

The PTT signal also sets the output of U12F high turning on Q13. Q13 sends a ground to the CTCSS board, telling to encode rather than decode.

Relay Outputs Section

There are four (4) relay outputs that are controlled by the processor. They are driven through opto-isolator U25 and spike protected to prevent voltage spikes from affecting the unit. The outputs appear on a connector at the bottom of the board and are all normally open with contact ratings up to 5 Amps and 240 Volts AC RMS. K3 and K4 outputs have selectable No or NC contacts.

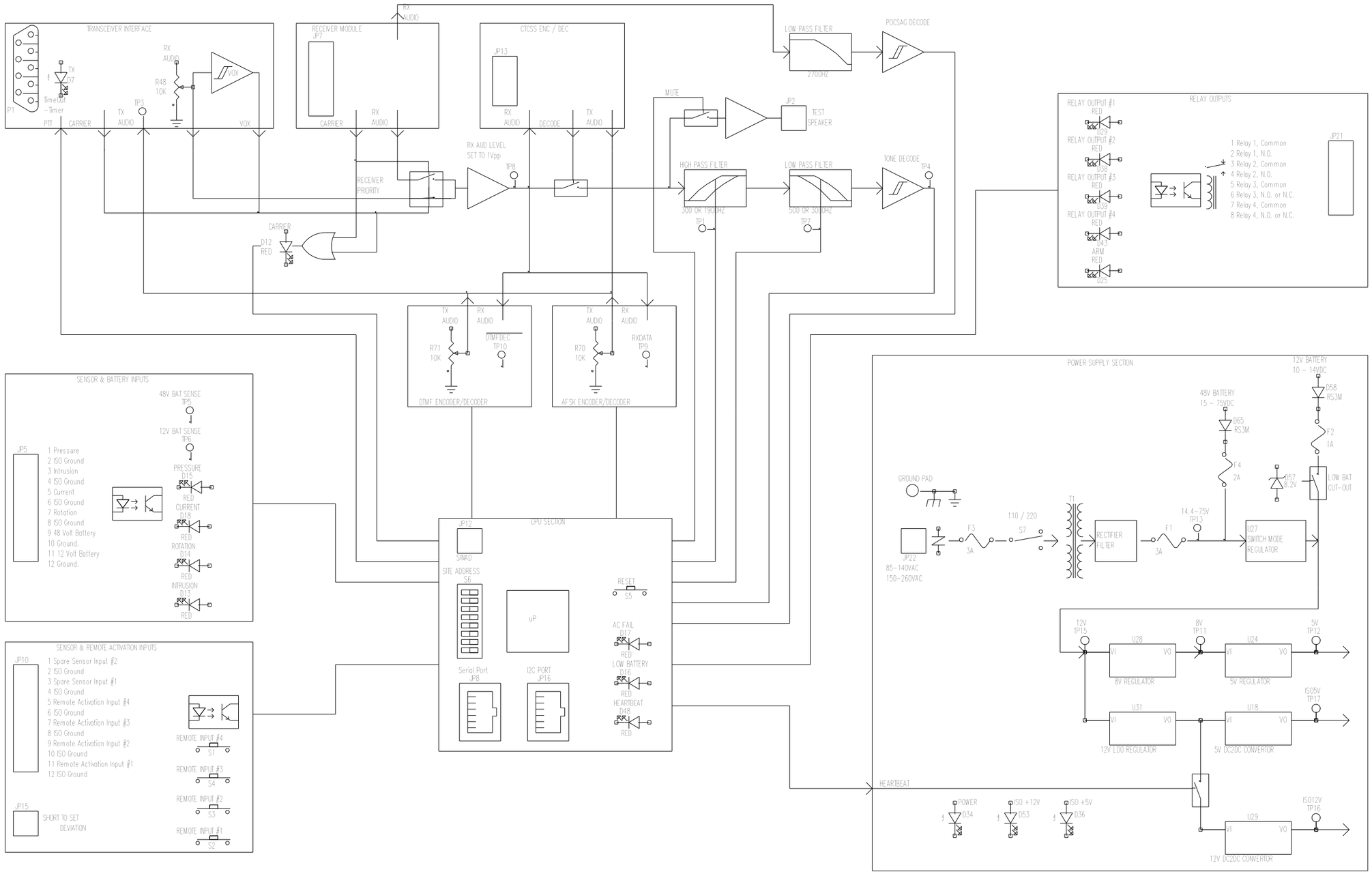
Speaker Output Section

The microprocessor (U13) generates warning sounds on pin 17, which are routed out thru amplifier U10 to the speaker output JP2.

Serial and I^2C Ports

Transmit serial data from pin 3 of the micro (U15) goes to U11 - pin 7, which converts the TTL level to +/- 12 volts RS232 levels and passes the transmit data to serial port JP8. Receive data from JP8 is likewise converted from RS232 levels to TTL levels and sent to the micro on pin 2.

Figure 5 DCFCTB Block Diagram



Software Description of DCFCTB Encoding Format

The DCFCTB encodes a nine (9) digit DTMF string that includes the RTU's unit type, id number, function status and sensors status.

Digit #	Description
1	Start Character, always a DTMF "*"
2	Unit type programmed into unit (see unit types)
3	Function status (see function currently running)
4	unit number: BCD most significant digit
5	unit number: BCD middle digit
6	unit number: BCD least significant digit
7	BCD of sensor status: (see decoding of sensor status)
8	BCD of sensor status: (see decoding of sensor status)
9	Terminating Character "*"

Table 1 Conversion of DTMF Digit to BCD

DTMF Character	BCD equivalent
1	0 0 0 1
2	0 0 1 0
3	0 0 1 1
4	0 1 0 0
5	0 1 0 1
6	0 1 1 0
7	0 1 1 1
8	1 0 0 0
9	1 0 0 1
0	1 0 1 0
*	1 0 1 1
#	1 1 0 0
A	1 1 0 1
B	1 1 1 0
C	1 1 1 1
D	0 0 0 0

Table 2 Unit Types

DTMF Character	DCFCTB types
A	Single motor mechanical
B	Three motor mechanical
C	2001AC or DCB

Table 3 Function currently running

DTMF Character	Function
0	Standby
1	Function 1
2	Function 2
3	Function 3
4	Function 4
5	Function 5
6	Function 6

Decoding sensor status

Sensor status decoding using the DTMF digit to BCD reports current sensor status. Depending on the type of unit selected the sensors required vary.

Table 4 Digit 7

Digit 7	DCB or 2001AC	Single Motor Siren	Three Motor Siren
Bit 1 (LSB)	Rotation	N/A	Rotation
Bit 2	Intrusion	Intrusion	Intrusion
Bit 3	Not used, always 0	Not used, always 0	Not used, always 0
Bit 4	AC power	AC power	AC power

Table 5 Digit 8

Digit 8	DCB or 2001AC	Single Motor Siren	Three Motor Siren
Bit 1	Battery voltage*	Battery voltage*	Battery voltage*
Bit 2	AUX 1	AUX 1	Blower motor
Bit 3	Activation current	Activation current	Activation current
Bit 4	Local activation	Local activation	Local activation

* Battery voltage refers to the 48V siren voltage.

Table 6 Bit Status

0	1
Rotation did occur	Rotation did not occur
Cabinet door is closed	Cabinet door is open
AC power is ON	AC power is OFF
AUX 1 closed	AUX 1 open
Blower did operate	Blower did not operate
Activation current detected	Activation current not detected
Battery voltage okay	Battery voltage low
Local activation occurred	Local activation did not occur

Example

Received DTMF report string *** C 1 D D 2 05 ***

*	Starting character
C	Unit type DCFCTB with 2001 siren
1	Currently running function 1
DD2	Siren site number (0000) (0000) (0010), which equals site number 002

0	Sensor status is (0000),	Bit 1 is 0, rotation occurred
		Bit 2 is 0, cabinet door is open
		Bit 3 is 0, not used, always 0
		Bit 4 is 0, AC power is on
5	Sensor status is (0101),	Bit 1 is 1, battery voltage is low
		Bit 2 is 0, AUX 1 is closed
		Bit 3 is 1, activation current not detected
		Bit 4 is 0, local activation occurred

Chopper Motor Current Sensor Theory of Operation

Overview

The adjustable current sensor 2001062B is a window comparator device that uses a Hall Effect current sensor and an LM358 based window comparator. The active high output is opto-coupled and the entire circuit is powered by an MC78L08AC voltage regulator IC. The ground for the circuit is selected by way of jumper J2 between isolated or earth ground. The operation of the circuit is such that if the current passing through the probe of the current sensor is larger than the lower preset level and is less than the upper preset level, an active high output results turning on the opto-coupled output, indicating that the sensed current is within the acceptable range.

Circuit Description

The circuit is energized when 12 VDC (nominal) is applied to J1-3 and ground is applied to J1-1. The 12 VDC at J1-3 is applied directly to the MC78L08AC voltage regulator, IC1. The regulated 8 VDC output of IC1 is applied to the LM358 dual op amp (IC2) at pin 8, to MC14001B quad NOR gate (IC3) at pin 14, and also to the Hall-Effect current sensor (CS1) at its (+) input.

Current probe CS1 is designed to generate a reference voltage of 1/2 the supply voltage on its (0) output pin. With 8.0 VDC at the (+) input of CS1 and ground applied at the (-) input of CS1, CS1 outputs 4.0 VDC on the (0) output when the current passing through the probe of CS1 is zero. This voltage is applied to R2, through which C4 is charged to 4.0 Volts, and this voltage is applied to the non-inverting input of IC2B and the inverting input of IC2A. The output of the current sensor is linearly scaled such that a change of 100 Amps in sensed current results in a change of 1.0 Volt at the output, and a change of 1.0 Amp results in a change of 0.01 Volts at the output. Using this calibration, POT1 and POT2 can be adjusted to set upper and lower current thresholds, respectively.

A typical application of the current sensor could be to set the device for an upper current threshold of 300 Amps, and a lower current threshold of 50 Amps. Using these values, the voltage at TP1 corresponding to 150 Amps is the following:

4.0V + (300A * 0.01V/A) = 7V

The voltage at TP1 corresponding to 70 Amps is the following:

4.0V + (50A * 0.01V/A) = 4.5V

Adjusting POT1 sets the upper current threshold voltage of 7V at TP2, and adjusting POT2 sets the lower current threshold voltage of 4.5 V at TP4. With a sensed current value between 50 and 300 Amps, the voltage at TP1 is between 4.5 and 7 Volts. Since the voltage at the inverting input of IC2B (pin 6, also TP2) is set to 7 Volts, and the voltage at the non-inverting input (pin 5) is less than 7 Volts, the output of IC2B (pin 7) is logic low. Similarly, since the voltage at the non-inverting input of IC2A (pin3, also TP4) is set to 4.5 Volts, and the voltage at the inverting input (pin 2) is greater than 4.5 Volts, the output of IC2A (pin 1) is also logic low.

The outputs of IC2A and IC2B are applied directly to the inputs of NOR gate IC3. With a logic low at both inputs of IC3 (pins 1 and 2), the output of IC3 at pin 3 is a logic high, approximately 8 Volts. 8 Volts applied through R1 to the input (pin 1) of opto-coupler IC4 causes the output transistor of IC4 to be saturated and a logic low is applied to J1-2, indicating that the sensed current is within the preset acceptable range.

In the case that the sensed current exceeds the upper current limit, the voltage at TP1 is larger than 7 Volts, putting the non-inverting input of IC2B at a higher potential than the inverting input, resulting in a logic high at the output of IC2B, which is applied to pin 1 of IC3. A logic high at either or both inputs of IC3 yields a logic low at the output of IC3, which causes the output transistor of IC4 to be cut off and a logic high is applied to J1-2, indicating that the sensed current is outside the acceptable range. J2-1 must be pulled high by whatever circuit it is

connected to. In similar fashion, if the sensed current falls below the lower current limit, the voltage at TP1 is less than 4.5 Volts, putting the inverting input at a lower potential than the non-inverting input, resulting in a logic high at the output of IC2A, which is applied to pin 2 of NOR gate IC3. As described above, this results in an active high applied to J1-2, indicating that the sensed current is outside the acceptable range.

Miscellaneous

Capacitors C1 and C3 are power supply bypass capacitors that act to absorb power supply line transients. Capacitors C2 and C5 dampen any transient voltages on the inputs of the op-amps.

Figure 6 Chopper Motor Current Sensor Board Schematic

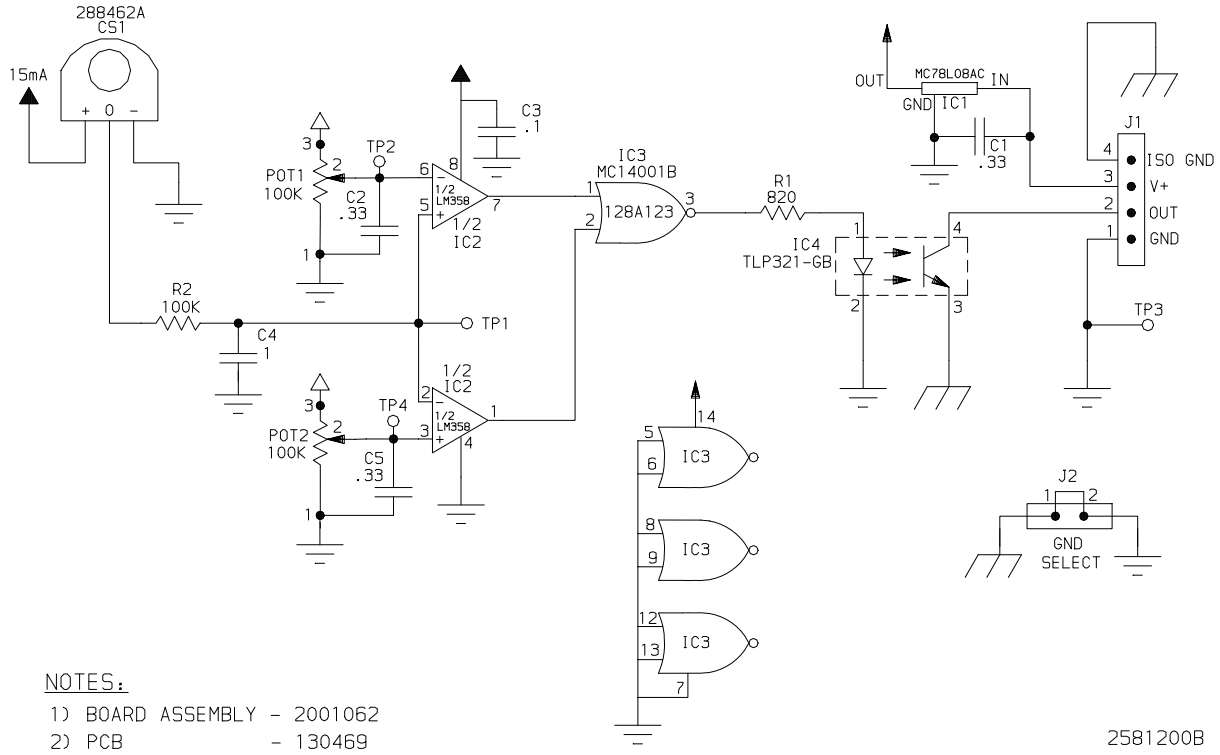


Table 7 Parts List

Federal Signal Part No.	Location	Description
107A907A	C1,C2,C5	CAPACITOR, MONO, 33 UFD
107A905A	C3	CAP, MONO, .01 UFD, 50V
1071033A	C4	CAPACITOR, MONO, 1 UF, 50V
128A217A	IC1	I.C., 8 VOLT, MC78L08ACP
128A045A	IC2	I.C., LM358, DUAL OP-AMP
128A123A	IC3	I.C., MC14001B
128254-01	IC4	I.C., TLP321GB OPTO
288462A	CS1	CURRENT SENSOR
105A276A	POT 1, POT 2	POTENTIOMETER, 100 K OHM
140351-01	PIN 1, PIN 2,	CONN, HEADER, 1 POSITION
	PIN 3, PIN 4	
140A235A-01	J1	CONNECTOR, 4 POSITION
301A122	J2,JU1,JU2	WIRE,BUSS,SOLID,22 GA.
100A247	R1	RESISTOR, CF, 820 OHM, 5%
100A262	R2	RESISTOR, CF, 100 K OHM 5%
103469B		PCB, ADJ. CURRENT SENSOR

Rotator Motor Current Sensor Theory of Operation

Overview

The Current Sensor board, 2005221 Rev B, is mounted on the backplane under the DC contactors. It monitors the DC current of the rotator motor. It scales the voltage reading to allow direct reading of the current passing through the sensor and employs a window comparator which signals that the current is between a lower and an upper limit.

Features

- Easy direct reading of current passing through the sensor
- Fixed window comparator, no adjustment needed
- Accurate to +/- 5%

Electrical Specifications

Input Voltage	7 VDC – 30 VDC
Input Current	<30 mA maximum
Measurement Current Ranges	0 to 5 Amps, 0 to 5 VDC at TP3
	0 to 15 Amps, 0 to 5 VDC at TP3
Window Comparator Thresholds	JP3 and JP4 not jumpered
	0.34 VDC min., 1.50 VDC max.
	(0.34 and 1.5 Amps)
	JP3 and JP4 jumpered
	1.00 VDC min., 2.67 VDC max.
	(3.0 and 8 Amps)
Window Comparator Output	Open collector, sink </= 500 mA

Connectors

JP1	Current Measurement Pass-Through
1	(+) voltage source
2	0-5 Amp (for gear driven rotators) output to motor, (-)
3	0-15 Amp (for belt driven rotators) output to motor, (-)

JP2	Interface, Power In and Signal Output
1	Ground
2	Window comparator output, open collector, pulls low when current is above minimum and below maximum current
3	DC supply voltage input (7 VDC to 30 VDC)
4	Analog sensor output. 0 – 5 VDC for 0 - 5 Amp input
	0 – 5 VDC for 0 - 15 Amp input

JP3 and JP4	Jumper headers
	Shorted to set window comparator thresholds for belt driven rotators

Circuit Description

Power Supply

Power enters through D1, is regulated down to 5 VDC, +/- 2% by U4 and is filtered by C2 and C3.

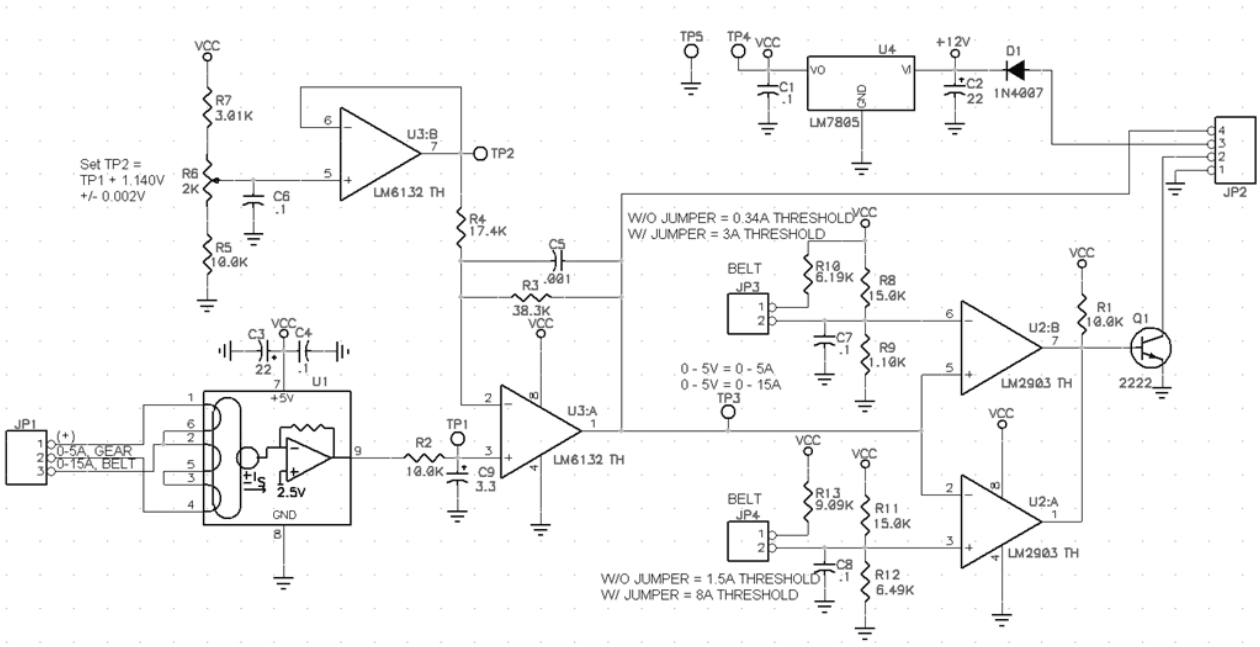
The Current Measurement Path

The current sensor, U1, outputs a fixed DC voltage (2.5 V) plus a variable voltage representing the current being measured. For the 0 - 5 Amp input a 2 Amp current draw would = 2.5 VDC + 0.625 VDC or 3.125 VDC.

U3B generates an offset voltage. This voltage is summed through U3A with the voltage from the current sensor. This subtracts off the 2.5 VDC from the current sensor leaving only the voltage representing the current being measured. U3A multiplies this voltage and scales it so that 1 Amp of current being measured = 1 VDC at TP3 (3 Amps = 1 VDC for the 0 - 15 Amp input).

The output of window comparator U2A and U2B goes high if the voltage is greater than the voltage at U2 pin 6 and less than the voltage at U2 pin 3. This turns on Q1 which pulls the output at JP2 pin 2 low.

Figure 7 Rotator Motor Current Sensor Board Schematic 2005221B



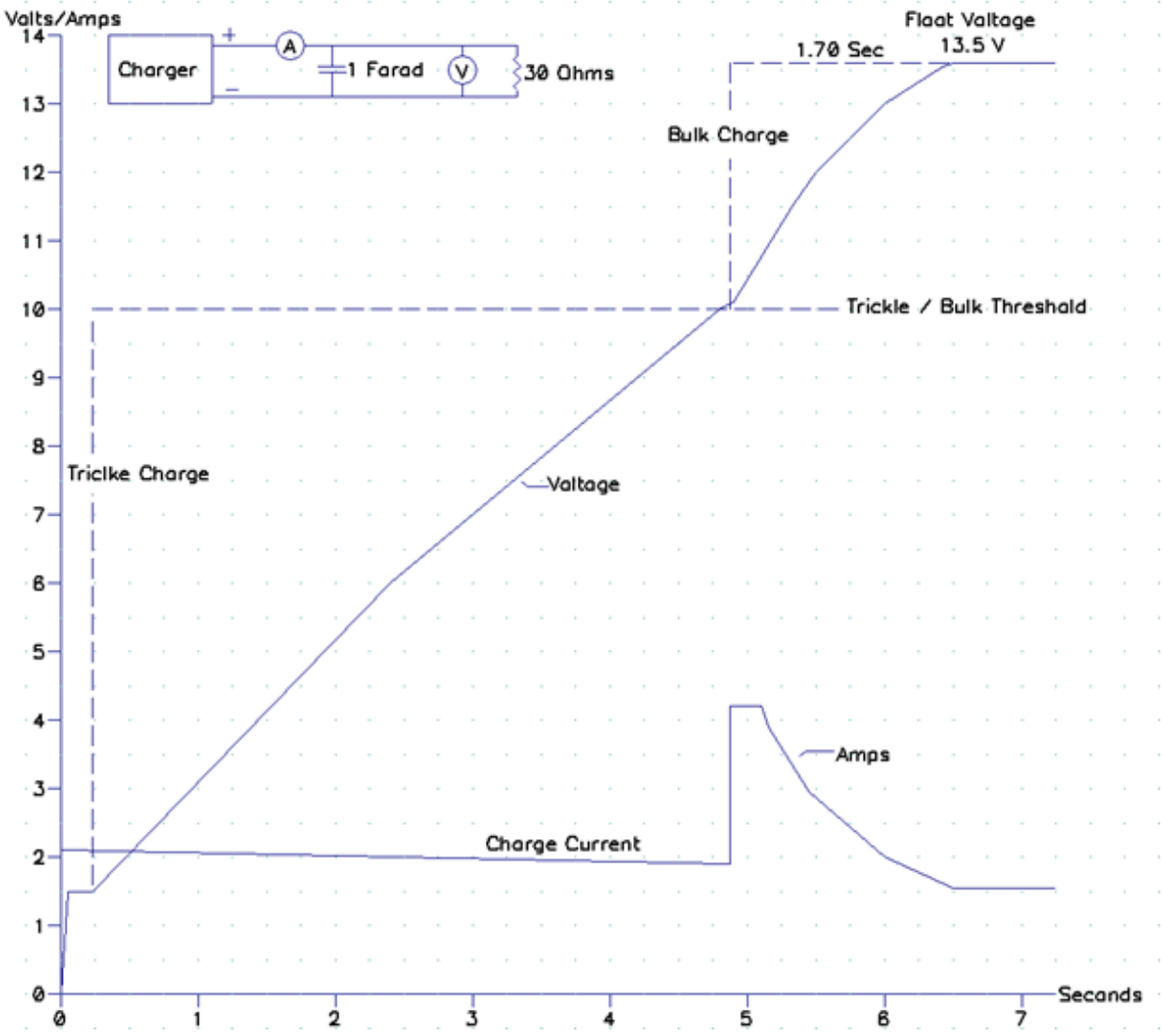
Battery Charger Theory of Operation

Overview

The charger features a switch mode voltage and current regulator to improve efficiency and reduce heat. It switches on each 60 Hz AC cycle, one at a time, as needed, to control voltage and current. The charger incorporates a three-stage charge algorithm to charge the battery without gassing and to maintain the batteries at the optimum charge level. The charger delivers a constant 2 Amp trickle charge until the battery's voltage reaches 10 Volts. The charger then limits the charge current to 4 Amps, the bulk charge, until the battery's voltage reaches the float voltage of 13.5 Volts. The charger also incorporates a temperature sensor that limits the charge current to 2 Amps if the ambient temp of the charger reaches 105°C.

Circuit Description

The charger implements a three-stage charging algorithm. The three stages are trickle charge, bulk charge, and float charge. The stages operate as follows.



The charger supplies a steady 2 Amp current to the battery until the battery voltage reaches a predetermined threshold value. The purpose behind trickle charging is to prevent a potentially hazardous condition caused by continuously pumping bulk charge current into a damaged battery. Too heavy a charge when the battery is in this severely discharged state can cause gassing which is corrosive, explosive and shortens the life of the battery.

Bulk Charge

The charger supplies as much current as the transformer can supply, limited to 4 Amps, during the bulk charge. The bulk charge starts as the battery voltage rises above the 10 Volt threshold. Current is applied until the battery voltage rises to 13.5 Volts.

Float Charge

The float charge is entered when the battery voltages reaches 13.5 Volts. The battery voltage is held at 13.5 Volts. While in the float state, the charger supplies up to 4 Amps to a load and the battery. The charger remains in the float/bulk charge state until the battery voltage drops below 9 Volts.

Voltage Regulator

Voltage entering from the transformer is converted to full-wave rectified D.C. by D9. This yields 120 positive going voltage peaks a second. Through resistor divider R17 and R18, U3-A compares the battery voltage to that of U5, a 5 Volt reference. If the battery voltage is less than 13.5 Volts, the output of U3-A goes high turning on Q5. This turns on SCR D3 allowing the one voltage peak to pass to the battery helping to raise its voltage. When the voltage peak falls back below that of the battery, the current through D3 drops to zero and D3 turns off. U3-A continuously sends voltage peaks to the battery until its voltage reaches 13.5 V.

Current Limiter

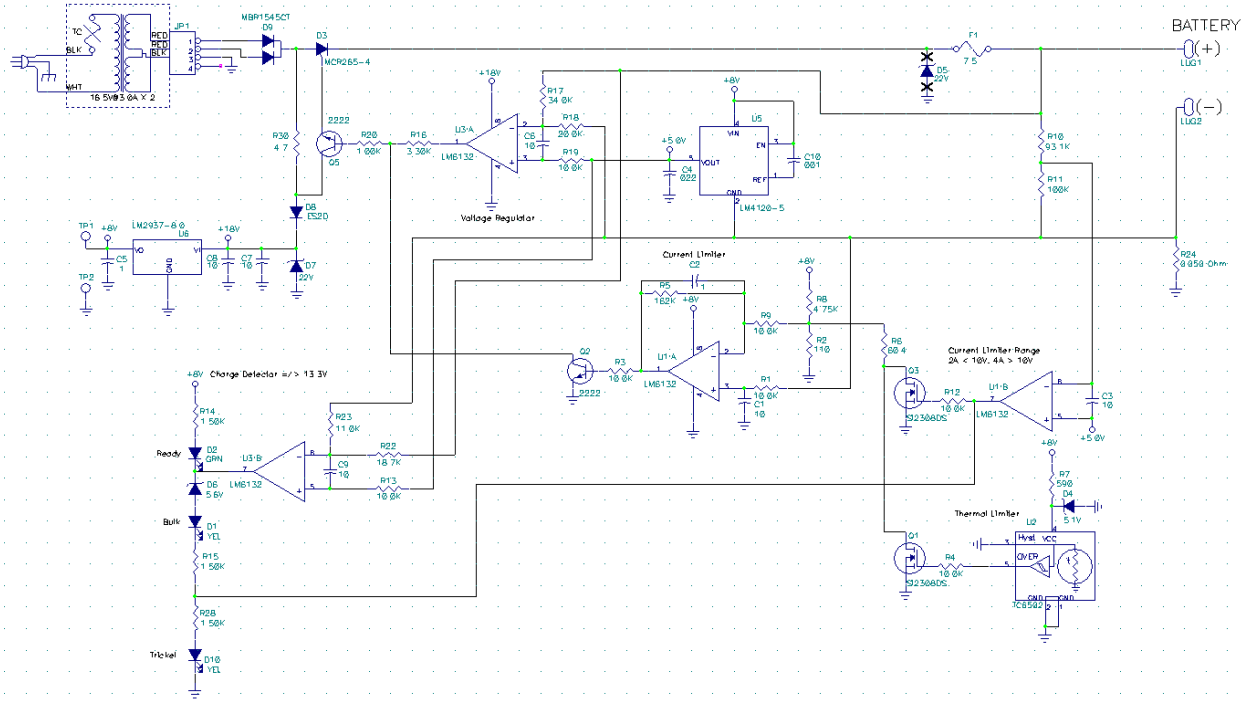
U1-A monitors the current output of the charger by watching the voltage developed across R24. If the current rises above 4 Amps, the output of U1-A rises, turning on Q2. This temporarily prevents U3-A from sending any peaks of voltage to the battery through D3 and reduces the current output.

U1-B monitors the battery's voltage. If it is below 10 Volts, the output of U1-B goes high turning on Q3 and pulling R6 to ground. This changes the current limiter's threshold from 4 Amps to 2 Amps.

Thermal Limiter

U2 monitors the temperature of the PC board. If the temp exceeds 105°C, the output of U2 goes high. This turns on Q1 and pulls R6 to ground. This limits the charge current to 2 Amps rather than 4 to help prevent the charger from overheating.

Figure 8 Charger Schematic



Programming Software

FSPWARE

FSPWARE is a Microsoft Windows® based programming software for two-tone and DTMF controlled systems. This software requires a direct connection between the siren and the computer's RS232 port via the use of a PCB universal cable adaptor.

The Commander™ Digital System Software (SFCDWARE)

SFCDWARE™ software is a Microsoft Windows® based program used to control, monitor and configure the digital version of the siren controller. The software communicates with the siren controller over an RS232 port. Refer to the Help menu provided with the software for operational details.

Installation

⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, experienced electricians in accordance with national and local electrical codes, acting under the direction of the installation crew safety foreman, should perform installation.

Explosive gases and corrosive materials may be present. To prevent explosion or severe personal injury, installation technicians must be experienced with the safe installation of lead-acid type batteries.

Recommendations on Control and Battery Box Location

First consider the siren location and method of activation before determining control and battery box location. You can activate the DCFCB and DCFCTB unit remotely through radio or landline controls and locally using pushbuttons provided in the control unit. Refer to the Land Line Control section on page 62 for additional information on remote activation using landline controls.

Since the controls are in a NEMA 4 rated enclosure and the batteries are protected, you may install the controls indoors or outdoors. If you install indoors, ensure adequate ventilation is provided for the four lead acid batteries to prevent build-up of explosive gas.

To ensure proper siren power is maintained, it is recommended that the control and battery box location be within a 50 feet wire run to the siren. If it is necessary to make a longer run, use a 1 AWG or larger wire for the siren motor.

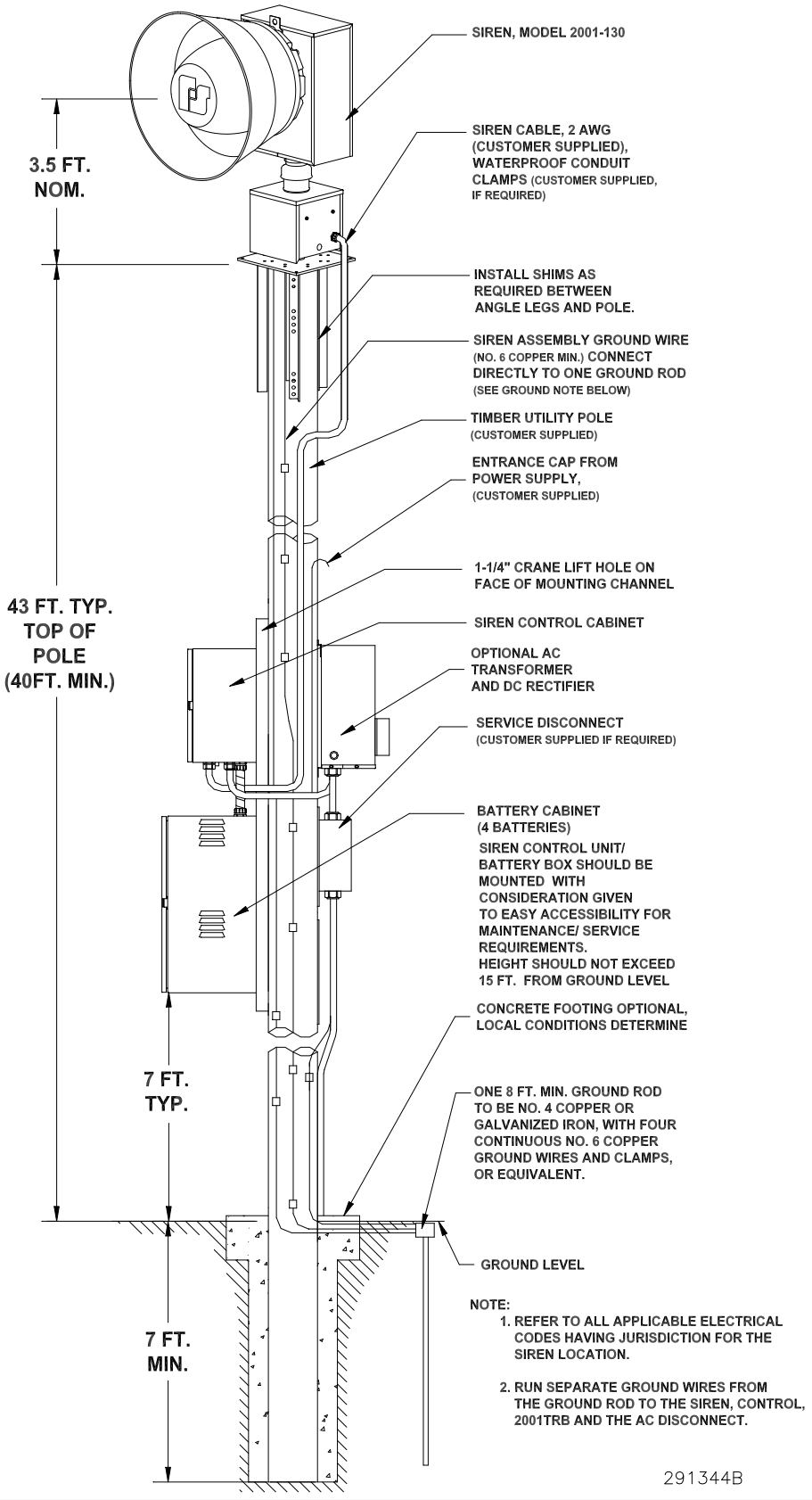
When mounting the control and battery box, it is recommended that the units be out of reach to avoid vandalism but accessible to service personnel. Both boxes come equipped with padlock hasps. Use these for added security.

The control and battery boxes are shipped mounted on an aluminum channel with four mounting holes for 1/2-inch bolts. The total weight of the control and battery box is approximately 364 pounds including the batteries. Therefore, insure that the mounting surface and fasteners can safely sustain the weight of the assembly and any additional environmental stresses placed on it.

Refer to Figure 9 Typical DCFCB or DCFCTB with 2001TRB Installation Drawing on page 50.

NOTE: When installing this product, insure that Local and NEC guidelines are followed.

Figure 9 Typical DCFCB or DCFCTB with 2001TRB Installation Drawing


SIREN, MODEL 2001-130
SIREN CABLE, 2 AWG (CUSTOMER SUPPLIED), WATERPROOF CONDUIT CLAMPS (CUSTOMER SUPPLIED, IF REQUIRED)
3.5 FT. NOM.
INSTALL SHIMS AS REQUIRED BETWEEN ANGLE LEGS AND POLE.
SIREN ASSEMBLY GROUND WIRE (NO. 6 COPPER MIN.) CONNECT DIRECTLY TO ONE GROUND ROD (SEE GROUND NOTE BELOW)
TIMBER UTILITY POLE (CUSTOMER SUPPLIED)
ENTRANCE CAP FROM POWER SUPPLY, (CUSTOMER SUPPLIED)
1-1/4" CRANE LIFT HOLE ON FACE OF MOUNTING CHANNEL
43 FT. TYP. TOP OF POLE (40FT. MIN.)
SIREN CONTROL CABINET
OPTIONAL AC TRANSFORMER AND DC RECTIFIER
SERVICE DISCONNECT (CUSTOMER SUPPLIED IF REQUIRED)
BATTERY CABINET (4 BATTERIES)
SIREN CONTROL UNIT/ BATTERY BOX SHOULD BE MOUNTED WITH CONSIDERATION GIVEN TO EASY ACCESSIBILITY FOR MAINTENANCE/ SERVICE REQUIREMENTS. HEIGHT SHOULD NOT EXCEED 15 FT. FROM GROUND LEVEL
CONCRETE FOOTING OPTIONAL, LOCAL CONDITIONS DETERMINE
7 FT. TYP.
ONE 8 FT. MIN. GROUND ROD TO BE NO. 4 COPPER OR GALVANIZED IRON, WITH FOUR CONTINUOUS NO. 6 COPPER GROUND WIRES AND CLAMPS, OR EQUIVALENT.
GROUND LEVEL
7 FT. MIN.
NOTE:
1. REFER TO ALL APPLICABLE ELECTRICAL CODES HAVING JURISDICTION FOR THE SIREN LOCATION.
2. RUN SEPARATE GROUND WIRES FROM THE GROUND ROD TO THE SIREN, CONTROL, 2001TRB AND THE AC DISCONNECT.
291344B

Control and Battery Box Installation

The control and battery box is attached to a length of 5 inches channel. There are five (5) pre-drilled holes in the channel:

- (1) 1-1/4 inches convenient lifting point
- (4) 5/8 inch mounting holes

The total weight of the control/battery boxes including batteries is approximately 364 lb (165 kg). Therefore, it is imperative that the mounting surface and mounting method selected can safely sustain the weight of the assembly. In addition, the mounting method and surface used must be able to withstand external mechanical stresses that may be applied to the assembly.

Installer Supplied Material List

The following is a general list of material required to install the model DCB/DCFCB/DCFCTB, 2001-130 siren, and the 2001TRB option. This list varies depending on mounting methods, length of pole, other options, local electrical codes, etc. Therefore, use this list as a reference guideline only. Stainless steel hardware is recommended.

Table 8 Installer Supplied Material List

Material Description		QTY
1. 240 VAC, 1 phase/3 wire, fused disconnect		1 ea.
2. FRN 30, 30 Amp time delay fuse		2 ea.
3. 100 Amp meter socket	(if required)	1 ea.
4. 1 inch meter hub	(overhead service only)	1 ea.
5. 1 inch service entrance	(overhead service only)	1 ea.
6. Fork bolt	(overhead service only)	1 ea.
7. ½ inch Liquid-Tight, 90 degree connectors	(2001TRB option primary feed)	2 ea.
8. 1 inch Liquid-Tight 90 degree connector	(2001TRB option secondary feed)	1 ea.
9. 1 inch Liquid-Tight 45 degree connector	(2001TRB option secondary feed)	1 ea.
10. ½ inch EMT compression box connector	(disconnect/meter ground)	1 ea.
11. 1 inch heavy wall compression fittings	(rotator cabinet/OH meter)	1 ea.
12. ½ inch Liquid-Tight flexible conduit	(2001TRB primary feed)	18 inches
13. 1 inch Liquid-Tight flexible conduit	(2001TRB option secondary feed)	7½ inches
14. ½ inch EMT thin wall conduit	(disconnect/meter ground)	10 feet
15. 1 inch aluminum rigid	(if applicable in your area/cabinetry-siren raceway)	50 feet
16. ½ inch nail drive straps	(securing ½ inch ground pipe)	4 ea.
17. ½ inch jiffy straps	(substitute for nail straps)	4 ea.
18. 1 inch heavy wall 2-hole straps	(1 inch raceway clamping)	15 ea.
19. 1 inch lock rings	(1 inch raceway tightening)	5 ea.

20. 1 inch plastic bushings		2 ea.
21. ½ inch plastic bushings		2 ea.
22. 1 inch close nipple	(1 inch raceway/cabinet-siren)	1 ea.
23. 1 inch chase nipple	(1 inch LB-cabinet connection)	1 ea.
24. 1 inch LB's withgaskets and covers	(1 inch raceway/cabinet-siren)	2 ea.
25. Split bolts, 10 AWG wire	(2001TRB option primary connection)	2 ea.
26. Mechanical lugs, 2 AWG wire	(2001TRB option/siren motor feed)	6 ea.
27. Mechanical lugs, 6 AWG wire	(system ground)	4 ea.
28. #6 copper ground wire	(system ground)	75 feet
29. 5/8 inch x 8' Copper Ground rod	(system ground)	1 ea.
30. Ground rod connector cold water type/ acorn style	(system ground)	1 ea.
31. 1 ¼ inches to 1 inch Reducing washer	(meter socket/O.H. service)	2 ea.
32. 1 ¼ inches Galvanized staples	(securing ground wire to pole)	30 ea.
33. ¾ inch Galvanized staples	(securing antenna cable)	30 ea.
34. 12 AWG THHN stranded CU wire	(orange/rotator motor feed)	40 feet
35. 14 AWG THHN stranded CU wire	(black/charger circuit)	40 inches
36. 14 AWG THHN stranded CU wire	(white/charger circuit)	40 inches
37. 10 AWG THHN stranded CU wire	(black/TR option primary)	30 inches
38. 16 AWG THHN stranded CU wire	(optional, black/proximity sensor)	45 feet
39. 16 AWG THHN stranded CU wire	(optional, brown/proximity sensor)	45 feet
40. 16 AWG THHN stranded CU wire	(optional, blue/proximity sensor)	45 feet
41. 2 AWG, 600V, stranded CU wire	(optional, 2001TRB 48V and ground)	12 feet
42. Green electrical tape (33+)	(ground wire identification)	1 roll
43. Red electrical tape (33+)	(48+ wire identification)	1 roll
44. White electrical tape (33+)	(neutral wire identification)	1 roll
45. Black electrical tape (33+)	(connector insulating wrap)	1 roll
46. Blue electrical tape (33+)	(identification marking)	1 roll
47. Rubber tape	(insulating connections)	1 roll
48. Spade crimp connector	(red-14 ga. wire/charger circuit)	2 ea.
49. Ring crimp connector	(1/4 inch stud size 12 ga. wire/rotator feed)	1 ea.
50. 1/4 x 20 ¾ inch hex head bolt	(ground connection on siren leg)	1 ea.
51. 1/4 x 20 standard flat washer	(ground connection on siren leg)	1 ea.
52. 1/4 x 20 inches intern/ extern star washer	(ground connection on siren leg)	1 ea.
53. 1/4 x 20 split washer	(ground connection on siren leg)	1 ea.
54. 1/4 x 20 hex head nut	(ground connection on siren leg)	1 ea.
55. 5/16 hex head nut	(ground connection on control cabinet)	1ea.

56. ½ inch x 4 inches hex head lag bolt	(securing TR option to utility pole)	3 ea.
57. ½ inch x 6 inches hex head SS lag bolt	(securing siren/control cabinet to utility pole)	16 ea.
58. ½ inch SS (stainless steel) flat washers	(backing ½ inch lag bolts)	19 ea.
59. 10 x 1 inch hex head, slotted, sheet metal screws (securing straps/equip to pole)		1 box
60. 10 x 2 inches hex head, slotted, sheet metal screws (securing straps/equip to pole)		1 box
61. 10 x 3 inches hex head, slotted, sheet metal screws (securing straps/equip to pole)		1 box

Pole Mounting

1. Remove any batteries from the battery box before lifting the control/battery box.
2. Use a crane to lift the control/battery unit to the desired mounting height along the pole.
3. Use the crane to hold the control/battery unit against the pole so that the four mounting holes on the mounting channel can be used as a template to drill four 3/8 inch holes at least 3-1/2 inch deep.
4. Attach the control/battery box to the pole using four user supplied ½ inch x 5 inches lag bolts. Slide a user supplied ½ inch flat washer onto each bolt before threading the bolt into the pole. Ensure the channel is plumb and straight. Do not bend the mounting channel by over tightening the lag bolts. Notch the pole or use shims if necessary to provide a flat stable mounting surface.
5. Mount a user supplied fused disconnect switch on the pole beneath or opposite the control/battery box assembly in accordance with Local and National Electrical Codes.
6. If the optional Transformer/Rectifier is required, drill three 3/8 inch holes at least 3-1/2 inches deep using the Transformer/Rectifier as a template. Attach the cabinet to the pole using three user-supplied ½ inch x 5 inches lag bolts. Slide a user-supplied ½ inch flat washer onto each bolt before threading into pole.

Flat Surface Mounting

1. Remove any batteries from the battery box before up righting the control/battery box.
2. Prepare the mounting surface for hanging the assembly using the steel channel as a template.
3. Attach the control/battery box to a wall or other substantial vertical surface using the four 5/8 inch mounting holes.

4. Mount a user supplied fused disconnect switch in accordance with Local and National Electrical Codes.
5. If the optional Transformer/Rectifier is required, attach the cabinet to a wall or other substantial vertical surface using the three mounting holes. Make sure that the mounting surface and mounting method selected can safely sustain the weight of the transformer. The weight of the Transformer/Rectifier is approximately 150 lb.

Electrical Connections

⚠ WARNING

Install the siren electrical system in compliance with local electrical codes and NEC recommendations. Federal Signal also recommends that all user-installed conduit connections enter from the bottom of the cabinet. Disconnect all power and read all warnings at the beginning of this manual and on the batteries before making connections.

⚠ CAUTION

The siren and control units must be solidly connected to an earth ground. If the siren is installed in a building, ground the system to a metallic object known to be grounded. For pole mount installations, drive a metal rod or bar at least 8 feet into the ground, as close as practical to the base of the pole. Use a separate, continuous 6 AWG or larger wire from the siren frame to ground and from the cabinet of each siren control unit to ground.

Figure 10 DCFCTB Wiring Diagram

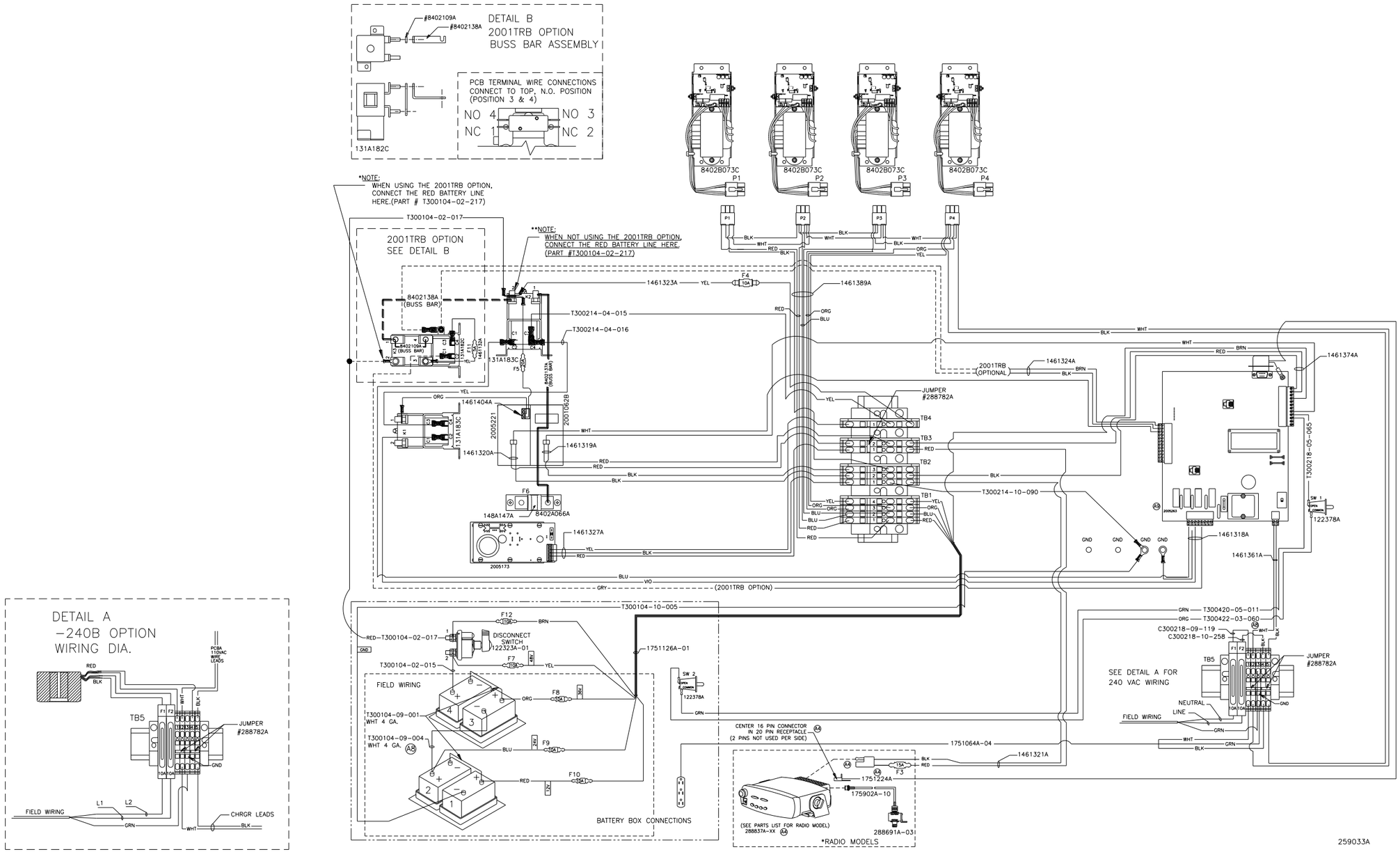


Figure 11 DCB Wiring Diagram

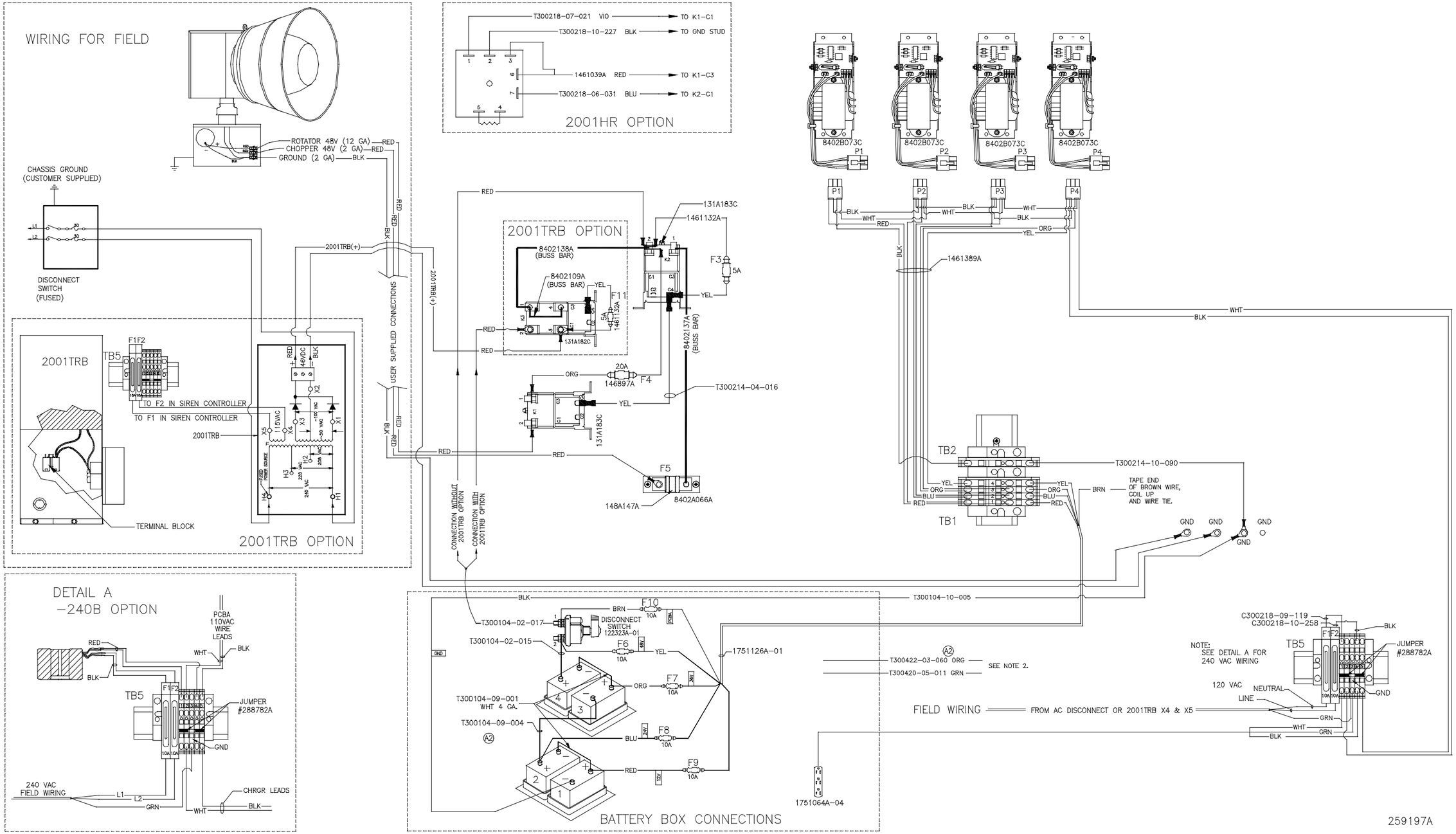
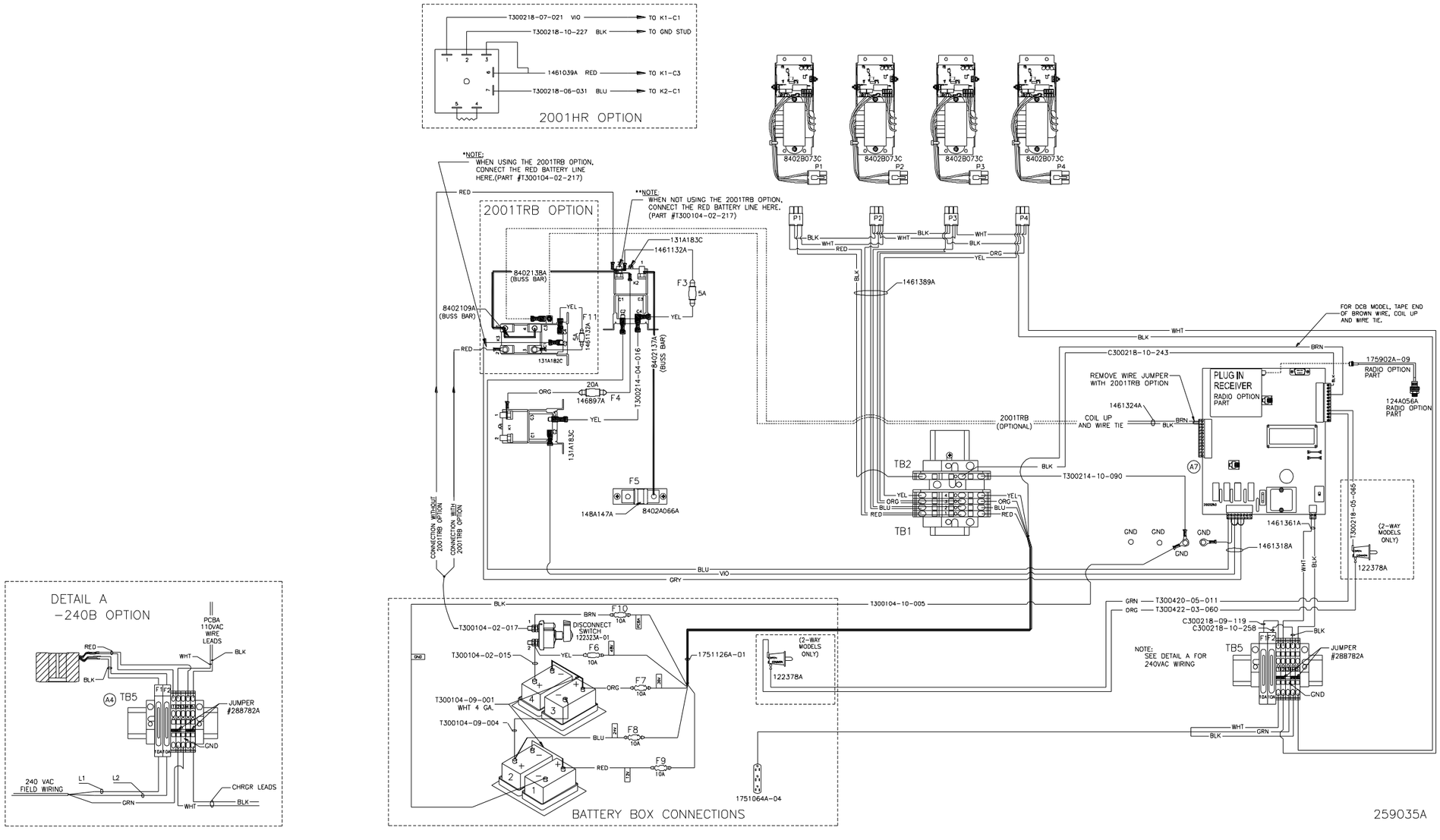


Figure 12 DCFCB Wiring Diagram



Siren Connections

The complete system wiring diagrams are shown in Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, Figure 12 DCFCB Wiring Diagram. All interconnections between the Siren and Control Unit are accomplished using three wires. Two 2 AWG wires provide operating power to the siren motor. A single 12 AWG wire provides operating power to the rotator motor. There are two terminal blocks located in the rotator housing of the siren that accept stripped wire, and a terminal block and relays in the control box that accept 1/4 inch and 5/16 inch ring terminals. These points provide convenient locations for making connections. Refer to the Options section on page 76 for wiring of options.

Siren and Control Unit Interconnecting Wiring

1. Install a 1inch user-supplied electrical conduit fitting in the bottom of the Control Unit cabinet and in the bottom of the siren rotator housing.
2. Install 1inch user-supplied electrical conduit between the conduit fitting in the bottom of the siren rotator housing and the conduit fitting at the bottom of the Control Unit cabinet.
3. Route the interconnecting wiring (user-supplied) from the siren rotator housing to the Control Unit cabinet through the conduit.
4. Connect a red 12 AWG wire from terminal 1 of the three position terminal block (TB1) in the rotator housing to the bottom open terminal of the rotator control relay, K1, using a ¼ inch ring terminal (user-supplied) at K1.
5. Connect a red 2 AWG wire from terminal 2 of the three position terminal block (TB1) in the rotator housing to the open left side of the 200 Amp fuse (148A147A) using a ¼ inch ring terminal (user-supplied). Refer to Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram.
6. Connect a black 2 AWG wire to terminal 3 of the three position terminal block (TB1) in the rotator housing. Run the black 2 AWG wire to a 5/16 inch backplane ground stud in the control cabinet (labeled GND) using a 5/16 inch ring terminal (user-supplied).
7. Ground the Siren and Control Unit to earth ground using separate continuous runs of wire (do not “T” from another ground wire).
8. Tighten all connections securely to provide good electrical connections.

AC Power Connections

⚠ WARNING

To prevent damage to the control unit, do not connect 240 VAC power without a model –240B step down transformer.

1. As shipped from the factory, the Control Unit is configured for 120 VAC operation. The AC selector switch, S7 on the siren control board, must be set to the 120 VAC position (refer to -240B Wiring on page 82 for operation at 240 VAC or 2001TRB Wiring on page 76 if the 2001TRB option is used).
2. After drilling or punching an appropriate sized hole in the bottom of the Control Unit cabinet, install a user supplied ½ inch electrical conduit fitting. Route ½ inch conduit (steel preferred) between a user-supplied fused disconnect switch and user-supplied conduit fitting in the bottom of the Control Unit cabinet.
3. Route three user-supplied wires through the conduit that was just installed between the Control Unit and the fused disconnect switch. Use 14 AWG wire or larger.
4. Connect Neutral (white wire) from service disconnect to F1 on the DIN rail in Control Unit cabinet (refer to Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram).
5. Connect Line (black wire) from service disconnect to F2 on the DIN rail in Control Unit cabinet (refer to Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram).
6. Connect Ground (green wire) from service disconnect to the green ground block on the DIN rail in Control Unit cabinet (refer to Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram). A small screwdriver must be pushed into the square opening in the terminal block to open the contacts of this block.
7. Follow the instructions included with the lightning protector (supplied) and install it in the service disconnect.
8. Size fuse or circuit breaker in service disconnect to 15 Amps max.

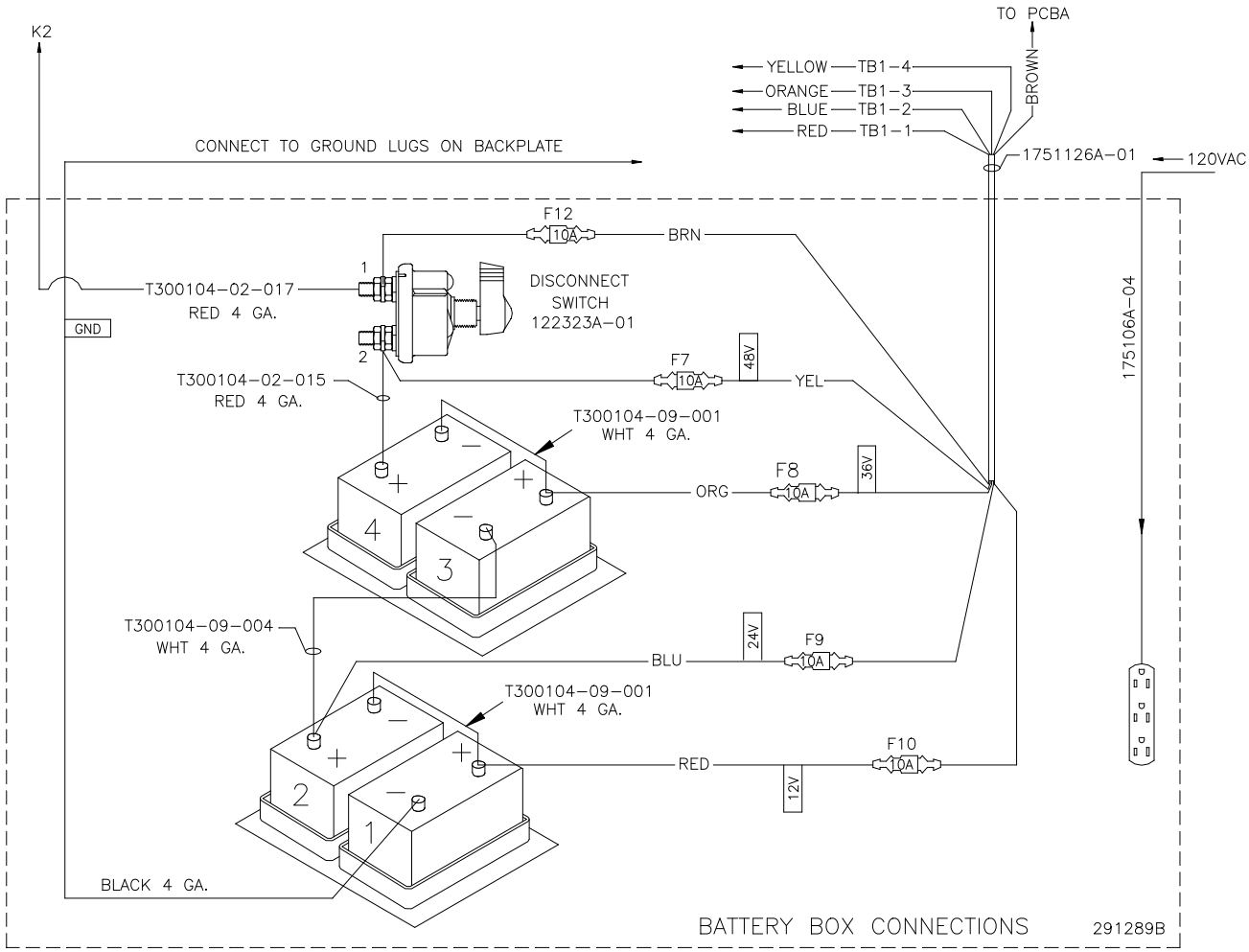
Battery Installation and Wiring

1. Install the batteries in the Battery Box, per illustration Figure 13 Battery Positioning and Wiring, taking care not to touch the battery terminals against cabinet. It may be necessary to temporarily relocate the wiring in the enclosure before installing the batteries. The polarity of the battery terminals is clearly marked on the battery case. See Figure 13 Battery Positioning and Wiring for correct orientation. (For optional battery warmers, refer to the Model HTR2 and

HTR4 (Battery Warmers) section on page 83 and Figure 21 HTR2 and HTR4 Wiring Diagram).

2. There are several wires entering the battery cabinet: a red 4 AWG, a black 4 AWG, and a multiple conductor cable. The red and black 4 AWG wires provide 48 VDC operating power to the siren. The multiple conductor cable provides the charge current for the batteries. Several white wires with lugs on each end are also packaged with the batteries. These white wires are used to connect the batteries in series.
3. Connect the wires to the batteries per Figure 13 Battery Positioning and Wiring and securely fasten all connections.
4. Apply user supplied silicon grease, or other oxide inhibiting compound to the battery terminals.

Figure 13 Battery Positioning and Wiring



Land Line Control

You may activate the controller by applying contact closures to the remote activation inputs. Refer to the Landline and Local Pushbutton Activation section on page 28 for a functional description and details on interfacing and wiring connections.

Antenna Installation

⚠ WARNING

To prevent electrocution or severe personal injury, install antenna away from power lines and install with proper grounding. Refer to section 810 of the National Electrical Code, ANSI/NAPA No. 70. Refer to Figure 16 Antenna Grounding on page 68 for details.

A factory installed internally wired Type N bulkhead is provided on the bottom side of the Control Unit for ease of antenna cable interface. The bulkhead requires the installation of a male Type N connector on the antenna cable for correct interface. It is essential that the installer follow all tuning (if applicable), installation and safety instructions provided by the antenna manufacturer.

Yagi Antenna Installation

Yagi Antenna Pre-Assembly Instruction:

1. Unpack the antenna and locate the following parts:
   - Boom (1-14 inches for 5 element model, 7/8 inch dia. for 3 element model)
   - 3/8 diameter elements (y---3 = 3 elements, y----5 = 5 elements)
   - Gamma match parts bag
   - Mounting bracket parts bag
2. Find the proper element dimension chart for your antenna, within the antenna instructions, and trim each element according to your operating frequency. Use care to trim equal lengths from each end of each element ensuring that the mounting hole is at the center.

   NOTE A: Proper trimming and adjustment is critical to the Voltage Standing Wave Ratio, known as VSWR. (High reflected power levels decrease forward power. The life of the radio and transmit capabilities are dependent upon the VSWR being low as possible).

   NOTE B: If two frequencies are being used, then trim the antenna to the transmit frequency of the unit where the antenna is mounted.

3. Insert the elements into their respective locations through the boom, starting with R1 (the reflective element) in the hole closest to the mounting holes. Then insert Dr, D1 etc. in that order.

   NOTE A: Shortest element is furthest away from the mount and increases in size as it gets closer to the mount.

   NOTE B: Be very careful to line up the holes and not cross thread when securing the elements in the next step. The bolts must tighten all the way down upon the lock washers.

4. Secure the elements with the stainless steel 10-32 hex bolts and #10 lockwashers provided.

5. Locate the connector/brass tube assembly in the gamma match parts bag and insert the assembly first through the connector bracket, then thread the connector into the bracket. Be sure to tighten the connector fully. A drop of Locktite or other thread lock may be used in the threads to eliminate the possibility of the connector loosening.

6. Slide the gamma link onto the driven element and assemble the gamma match as shown in figure 1 or 2 (under the antenna instructions provided by the antenna manufacturer). Set dimensions “A” and “B” to those shown in table 1. Setting the match to the dimensions shown for your antenna is a good starting point, which allows you to quickly line tune later. Complete the assembly by attaching the end cap onto the end of the gamma tube. The antenna is now ready for final tuning.

Final VSWR tuning

1. Before final installation of the antenna, temporarily set it up in a clear area at least six feet above the ground.

   NOTE A: Do not touch the antenna while the radio is transmitting.

   NOTE B: Ensure antenna is not touching any conductive material and is pointed away from all objects and people. Pointing antenna at objects in close proximity may act as a reflector and create inaccurate readings.

2. Apply RF power to the antenna at the transmit frequency to be used at that antenna, and check for the low VSWR while performing each of the following steps.

   A. Loosen the setscrew with the Allen key provided and make a slight adjustment to the aluminum gamma tube for the lowest VSWR (Reflected power).

   B. Adjust the gamma link along the driven element for the lowest VSWR.

   C. Repeat the above steps until the lowest VSWR is achieved. Reflected power must be less than 10% of the forward power.

D. Return to the dimensions shown in table 1 if there is any trouble achieving a good match. If the element dimensions are incorrect for the frequency being used, low VSWR may be unattainable. If the VSWR specification is still unattainable, replace the cable (A simple ohm meter check of the cable does not guarantee that the antenna cable is good, due to the DMM not having the ability to check the cable at high frequencies. If that does not take care of the problem, replace the antenna.

Mount Yagi Antenna

Refer to Figure 14 Yagi Antenna Installation Example.

1. Install antenna, (using installation bracket or equivalent) as high as possible, such that the antenna cable and obstacles allows, and install on side of pole closest to the receiving station. Aim antenna at receiving station.

   NOTE: Objects around the antenna affects the antenna, keep antenna pointed away from objects.

2. Ensure antenna cable connections are tight. Seal all connection points with heat shrink or tape and seal with Scotch Coat, or equivalent.

3. Apply RF power to the antenna at the transmit frequency to be used at that antenna, and check the VSWR (Reflected power). Reflected power must be less than 10% of the forward power.

   If the VSWR specification is unattainable, replace the cable (a simple ohm meter check of the cable does not guarantee that the antenna cable is good, due to the DMM not having the ability to check the cable at high frequencies). If that does not take care of the problem, replace the antenna.

Omni Fiberglass Antenna Models: (no tuning required)

Refer to Figure 15 Omni Antenna Installation Example.

1. Install antenna, (using installation bracket or equivalent) as high as possible, such that the antenna cable and obstacles allows, and install on side of pole closest to the receiving station.

   NOTE: Objects around the antenna affects the antenna, keep antenna away from objects, and at least ¼ wavelength from siren pole.

2. Ensure antenna cable connections are tight. Seal all connection points with heat shrink or tape and seal with Scotch Coat, or equivalent.

3. Apply RF power to the antenna at the transmit frequency to be used at that antenna, and check the VSWR (Reflected power). Reflected power must be less than 10% of the forward power.

If the VSWR specification is unattainable, replace the cable (A simple ohm meter check of the cable does not guarantee that the antenna cable is good, due to the DMM not having the ability to check the cable at high frequencies). If that does not take care of the problem, replace the antenna.

Figure 14 Yagi Antenna Installation Example

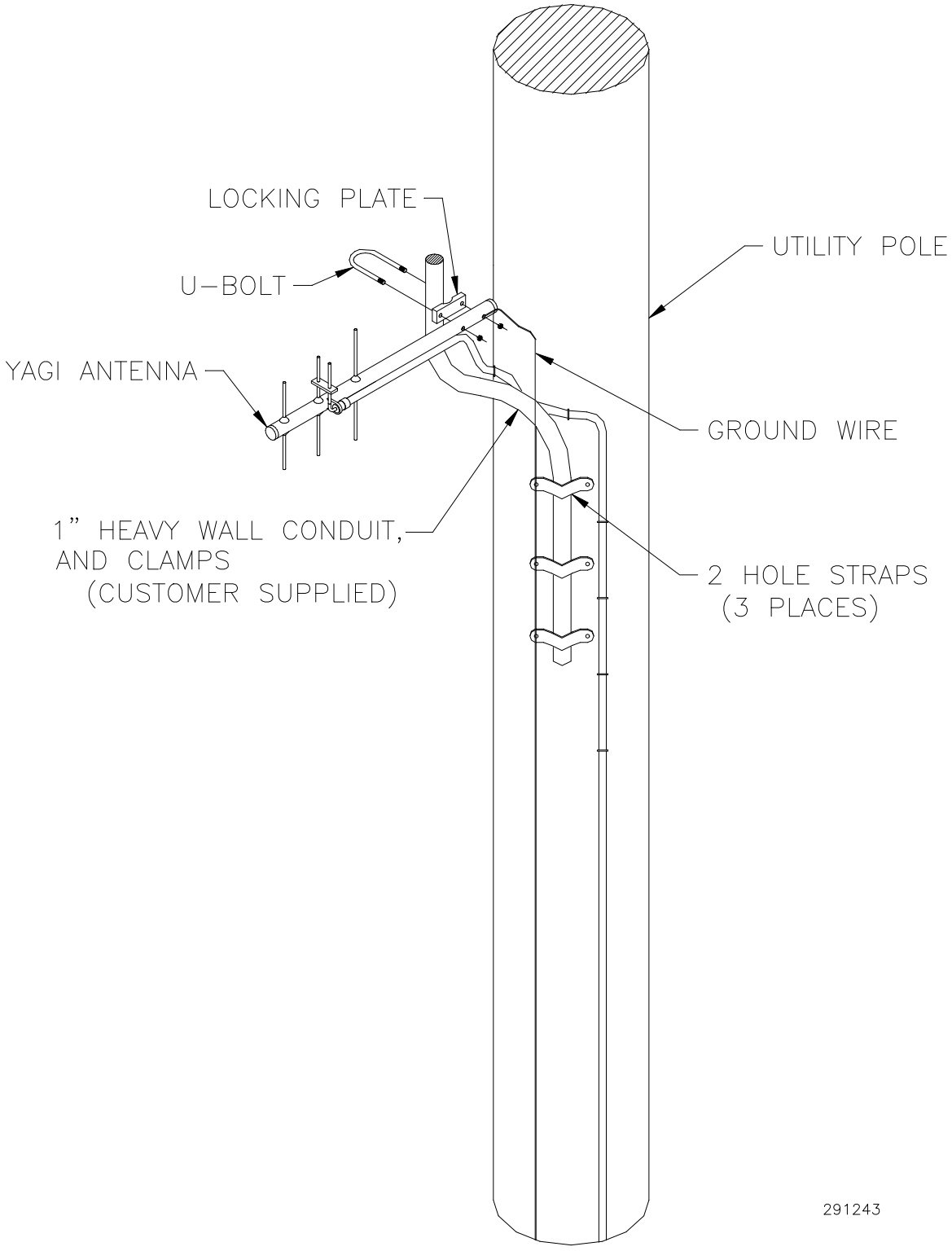


Figure 15 Omni Antenna Installation Example

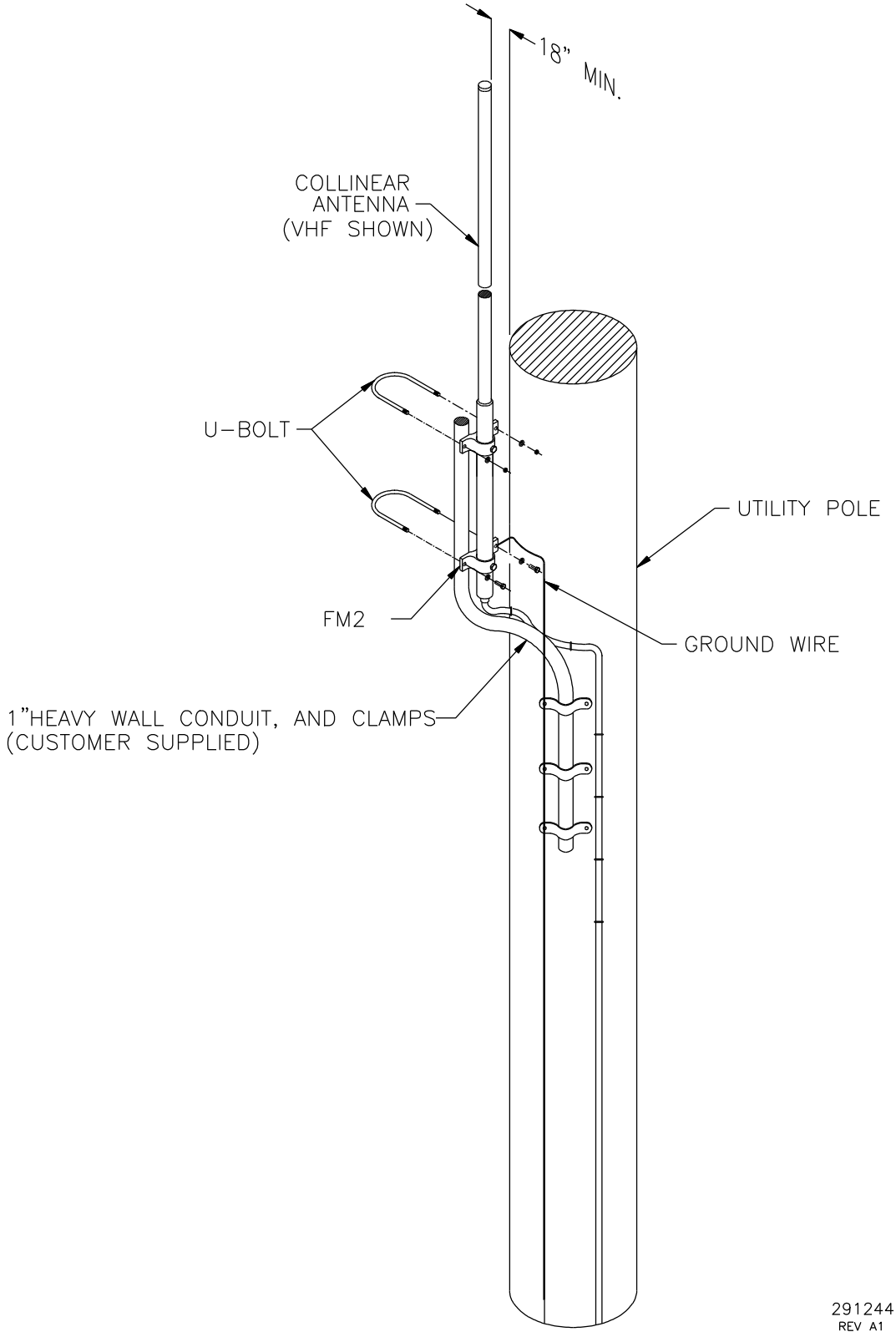
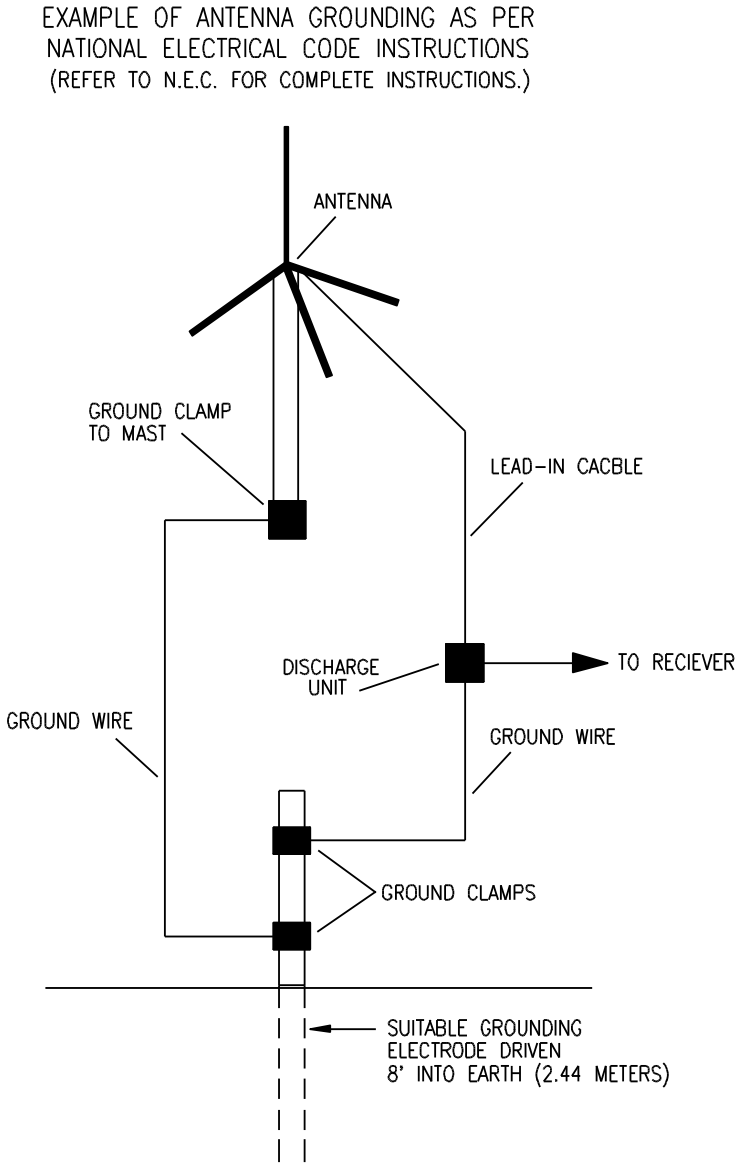


Figure 16 Antenna Grounding



A. USE NO. 10 AWG COPPER, NO. 8 AWG ALUMINUM, NO. 17 AWG COPPER CLAD STEEL OR BRONZE WIRE, OR LARGER AS GROUND WIRE FOR BOTH MAST AND LEAD-IN.

B. SECURE LEAD-IN CABLE FROM ANTENNA TO ANTENNA DISCHARGE UNIT AND MAST GROUND WIRES TO HOUSE WITH STAND-OFF INSULATORS, SPACED FROM 4 FEET (1.22 METERS) TO 6 FEET (1.83 METERS) APART.

C. MOUNT ANTENNA DISCHARGE UNITS AS CLOSE TO WHERE LEAD-IN CABLE ENTERS HOUSE AS POSSIBLE.

291160

Pre-operational System Testing

⚠ WARNING

The output sound level of a siren is capable of causing severe hearing discomfort or permanent hearing damage. Therefore, always wear adequate hearing protection and minimize exposure time when performing any testing or maintenance on the siren.

⚠ WARNING

Failure to properly test the siren system before placing into service may prevent the siren from operating in an emergency. The following tests and calibrations must be performed by an experienced technician prior to using the siren system.

Initial Sensor Adjustments and Testing

To ensure proper and reliable two-way status operation, the operation and alignment of the sensors must be confirmed when the siren and control are installed. All of the sensors are factory adjusted and the following alignment instructions may only pertain to tuning replacement sensors.

Rotation Current Sensor

Locate the rotation current board (2005221) on the backplane of the control cabinet with the blue current sensor (refer to Figure 10 DCFCTB Wiring Diagram on page 56). This board is preset at the factory and should not be adjusted.

To check the board for proper operation, do the following:

1. Verify that the output at JP2-2 is high (4 – 5VDC).
2. Activate a siren function by momentarily depressing one of the function pushbuttons on the controller board.
3. Measure the DC voltage on TP2. The voltage should correspond to the DC current draw of the siren motor (0.8 ADC, +/- .3 A).
4. Verify the output JP2-2 is low (0-1 VDC) for the duration of the siren function.

Chopper Current Sensor

Locate the chopper current board (2001062) on the backplane of the control cabinet (refer to Figure 10 DCFCTB Wiring Diagram on page 56).

Adjustment Procedure

1. Using Pot 1, adjust the voltage at TP2 to 7 VDC.
2. Using Pot 2, adjust the voltage at TP4 to 4.5 VDC.

Activate a siren function by momentarily depressing one of the function pushbuttons on the controller board. Verify that input #4 indicator (D14) on the controller board turns on for the duration of the siren function.

AC Power Sensor

Verify that the AC power indicator (D17) on the controller board is on while AC power is active. Measure across F1 TB5-1 and TB5-5 for 120 VAC. Confirm that with the AC power source turned off (via service disconnect) the AC power indicator is off.

Intrusion Sensor

With one cabinet door open, verify that intrusion indicator (D13) is ON. Depress the intrusion switch located on the cabinet door. With the switch depressed, confirm that the intrusion indicator is OFF. Verify the switches on both cabinet doors operate correctly.

NOTE: A jumper preset at JP9 also causes all of the LED's to go dim when intrusion switch is pressed.

Battery Voltage Measurement

1. Allow the batteries to charge for 24 hours to ensure they are fully charged.
2. Turn off AC power to the battery chargers by disconnecting power at the service disconnect or opening F1 and F2 in the control cabinet.
3. Using a digital multi-meter (Fluke model 75 or equivalent), measure the batteries individually utilizing the following test points (refer to Figure 10 DCFCTB Wiring Diagram on page 56 for details).

   TB1-1 and Chassis Ground = 13.5 VDC*

   TB1-1 and TB1-2 = 13.5 VDC*

   TB1-2 and TB1-3 = 13.5 VDC*

   TB1-3 and TB1-4 = 13.5 VDC*

   TB1-3 and TB1-4B = 13.5 VDC*

   * Voltage reflects battery float voltage and varies depending on state of charge.

4. Measure the combined battery voltage between chassis ground and TB1-3. The measured voltage depends on the batteries' state of charge and should be 54.0 +/ 1 V.
5. While monitoring the voltage in step 4, manually activate a steady siren function by depressing the appropriate function pushbutton on the controller board. If the measured voltage drops below 40 VDC, it is an indication of weak batteries and causes the controller to terminate the siren function. If a low battery condition is

indicated, follow up by load testing each battery with an automotive type battery load tester (180 Amp load recommended).

6. Turn AC power on by connecting F1 and F2 and turning on the service disconnect switch.

Battery Charger Voltage Measurement

To measure the output voltage of each charger, it must be connected to a battery. Since the battery's state of charge affects the output voltage of the charger, the measured voltages varies. Use a digital multi-meter to measure each battery charger individually (refer to the test points given in the Battery Voltage Measurement section on page 70). The output voltage of each battery charger should be between 13.4 VDC and 13.6 VDC when connected to a fully charged battery.

2001TRB Transformer/Rectifier testing (optional)

1. With the AC service turned on, measure for 46.0 VDC, +/- 0.5 VDC between K3-3 and chassis ground (refer to Figure 18 Transformer Rectifier Wiring to Control Unit).
2. Confirm that K3 is energized.
3. Shut off the service disconnect and confirm that K3 de-energizes.

Manual Siren Activation

Manually depress each function button and confirm correct siren operation. Refer to the controller programming and test data sheet (shipped with controller) for siren function details.

Land Line Siren Activation (*optional*)

Confirm that the user-supplied telephone control relay provides each appropriate remote function input with a momentary contact closure (1 second nominal) and observe proper siren activation. Refer to the Control Board Power Input section on page 29 for details on interfacing and wiring.

Transceiver Audio Level Adjustments and VSWR Testing

Due to the test equipment requirements and RF control systems knowledge required to perform the following controller testing; only a qualified two-way Radio Service Technician should conduct the following test steps.

To ensure reliable radio controlled siren operation, the following testing must be conducted upon initial controller installation. For the following steps, connect the Communications Service Monitor to the RF bulkhead mounted on the bottom side of the control cabinet.

DTMF Transmit Level Adjustments (DTMF versions of DCFCTB only)

1. To Transmit and generate a DTMF test tone, apply a jumper across the JP15 on the FCT controller board, (refer to Figure 3 Communications/Controller Board Layout on page 24 for details).
2. Confirm the deviation level is at 3.0 kHz (or 1.5 kHz for a 12.5 kHz spaced channel). This level has been pre-set at the factory, however if adjustment is required, set R71 on the controller board for the required deviation.
3. Utilizing an in-line Watt meter, confirm that the forward radiated power output matches the specified power output listed on the final test data sheet supplied with unit within 20%. Also verify that the VSWR is less than 5%. Refer to the Installation section if the VSWR is excessive.

FSK Transmit Level Adjustments (Digital FSK versions of DCFCTDB only)

1. To Transmit and generate an FSK modem tone, apply a jumper across the JP15 on the FCT controller board, (refer to Figure 3 Communications/Controller Board Layout on page 24 for details).
2. Confirm the deviation level is at *3.0 kHz. This level has been pre-set at the factory; however if adjustment is required, set R70 on the controller board for the required deviation. If CTCSS is used, set the CTCSS level to 0.75 kHz.
3. Using an in-line Watt meter confirm that the forward radiated power output matches the specified power output listed on the final test data sheet supplied with unit within 20%. Also verify that the VSWR is less than 5%. Refer to the Installation section if the VSWR is excessive.

   *__NOTE__: Deviation levels are cut in half on 12.5 kHz spaced channels.

Receive Level Adjustments

1. Inject a 100uV carrier signal modulated with a 1 kHz tone at *3.0 kHz deviation for DTMF systems. Use *3.0 kHz deviation for digital systems.
2. Connect an oscilloscope to TP8 on the controller board and confirm a clean, undistorted sinewave of 1 V_{p-p}. The level has been pre-set at the factory; however, if adjustment is required, set R48 on the controller board to 1 V_{p-p} for the external transceiver. The level of the on-board receiver module is fixed and does not need to be adjusted.

   *__NOTE__: Deviation levels are cut in half on 12.5 kHz spaced channels.

Two-tone and DTMF Controller Decode-ability Testing

1. Unplug JP21 to disable the siren.
2. With the transmit modulation level set to *3 kHz from the communication monitor inject a 0.5 uV carrier signal.

*__NOTE__: Deviation levels are cut in half on 12.5 kHz spaced channels.

3. Encode the appropriate DTMF strings and or 2-tone tones required to activate the desired siren function. Confirm reliable decoding of at least 10 of 10 tries.
4. Plug JP21 back in.

Confirming Controller Auto-Reporting

By toggling one of the following sensor inputs, confirm that the controller sends a correct report to the SS2000 base controller. Note that with digital systems the DCFCTDB must be programmed to auto-report the following sense points to perform this test.

Intrusion

Depress intrusion switch for at least 5 seconds. Release the switch. Verify the door closed and door open reports we received at the SS2000.

AC Line Voltage

By removing AC power at the service disconnect confirm that a report is generated within 5 minutes. Confirm that another report is generated when power is restored.

⚠ WARNING

The output sound level of a siren is capable of causing severe hearing discomfort or permanent hearing damage. Therefore, always wear adequate hearing protection and minimize exposure time when performing any testing or maintenance on the siren.

Test Activation Codes

Test all siren functions from the siren control point. This test must be performed to ensure all desired siren functions have been properly entered at the control station and at the siren site. Request a report from the control station during the siren function. Verify the report indicates the proper status conditions for the site being tested.

Service and Maintenance

⚠ WARNING

The siren has moving parts, high operating current, explosive gases, corrosive materials, and high output sound levels which could cause severe personal injury, electrocution, or death.

Service or maintenance should be performed by qualified personnel familiar with the siren, associated controls, and power sources being used.

Before servicing or maintaining, ensure that remote activation cannot occur and disconnect power to the siren and the associated control equipment.

General Information

The Model 2001-130 Siren and Controllers are designed to require a minimum of maintenance. In addition, historical experience has shown that all Federal sirens are highly reliable devices. However, if a siren or controller failure does occur, Federal Signal will provide technical assistance with problems that cannot be handled satisfactorily and promptly locally. If replacement parts are needed, refer to the parts list in Figure 27 DCFCTB Final Assembly, Figure 28 DCB Final Assembly, and Figure 29 DCFCB Final Assembly on pages 93, 94, and 95.

If you are experiencing any difficulties, contact Federal Signal Customer Care at: **(800) 548-7229** or Technical Support at: **(800) 524-3021**

Website: http://www.alertnotification.com/
E-mail: techsupport-ans@federalsignal.com

Federal Signal
2645 Federal Signal Drive
University Park, Illinois 60484-3167

Preventative Maintenance

To insure that the warning system is fully operational and to maintain the highest possible level of reliability, perform the following monthly testing and annual inspection. In order to maintain the integrity of the warning system, prompt investigation of any reported failures must be researched and corrected promptly.

Monthly Testing

The following is a typical monthly test outline:

1. Reset all sirens to clear latched sensor status inputs (DTMF systems only).
2. Activate one of the siren functions (3 minute activation recommended). If the 2001ACB option is used, test both AC and DC operation.

3. Poll the system for siren status reports.
4. Examine each site report for any failed condition. If you detect a failure condition, notify designated service personnel.

Annual Inspection

Perform the pre-operational system test procedure on an annual basis. Refer to the Pre-operational System Testing section on page 69 for details.

Options

Model 2001TRB

This option uses a transformer/rectifier for primary system power with battery back-up and allows the siren to operate from a 208, 220 or 240 VAC power source without the use of the batteries. During a power failure, an automatic switch to battery operation occurs to maintain the siren's normal operation. Specify the AC line voltage when ordering.

The 2001TRB has a 115 VAC secondary tap to provide power to the siren control cabinet.

2001TRB Mounting Location

Keep wire lengths to a minimum. Mount the transformer assembly as close as possible to the Control Unit/Battery Box.

2001TRB Specifications

OPERATING

Voltage	208/220/240 VAC, 60 Hz single phase
Current	30 Amps approx. (nom.) (50 Amp service recommended)
Fusing	35 Amps, slow blow
Weight	150 pounds (68.2 kg.)
Dimensions	23.5 inches H (596 mm) x 10.25 inches W (260 mm) x 11.75 inches D (298 mm)

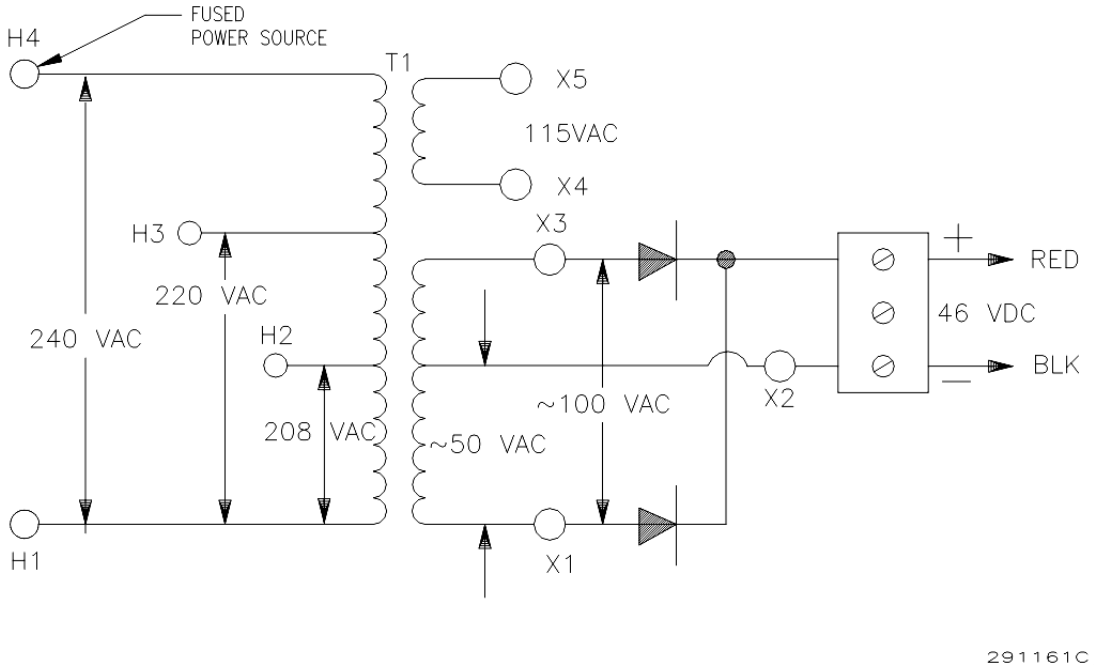
2001TRB Wiring

⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, only experienced electricians should install this product in accordance with national and local electrical codes.

NOTE: Federal recommends using wire no smaller than 3 AWG between the transformer and the Control Unit/Battery Box. To perform the wiring, proceed as follows (refer to Figure 17 Schematic Diagram 2001TRB and Figure 18 Transformer Rectifier Wiring to Control Unit).

Figure 17 Schematic Diagram 2001TRB



⚠ WARNING

When wiring the Model 2001TRB to control unit, installer must follow wiring instructions as in Figure 18 Transformer Rectifier Wiring to Control Unit or damage may occur to control unit and/or batteries.

Preparation

1. Refer to Figure 9 Typical DCFCB or DCFCTB with 2001TRB Installation Drawing, Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram for wiring details.
2. Remove the 2001TRB, Transformer/Rectifier from its shipping crate and stand the transformer on its top to expose the inspection covers located on the bottom side (refer to Figure 19 2001TRB Transformer Rectifier Parts List).
3. Remove the four (4) 3/8 inch hex head bolts that secure the inspection covers and remove the inspection covers from the transformer.
4. Pull the three (4) primary lines marked H1, H2, H3, and H4 and Secondary lines X4 and X5 from the inside of the transformer.
5. Punch out two knockouts in the transformer; use one ½ inch for AC in and one 1 inch for 120 V and 48 V out to the controller.

6. Install a 1 inch 45 degree Liquid-Tight connector into the 1 inch opening on the transformer. Face the connector to the rear of the transformer and tighten the 1 inch lock ring. Put a 1 inch plastic bushing over the exposed thread end on the 1 inch connector.
7. Cut a section of 1 inch Seal-Tight, 7 inches in length. This provides raceway for the 48 VDC secondary and for control cabinet 120 VAC input.
8. Cut a section of ½ inch Seal-Tight 18 inches in length. This provides A/C input voltage from the AC disconnect to the transformer. If the AC disconnect does not have 120VAC available, the X4 and X5 taps in the 2001TRB may be used to provide AC voltage to the control cabinet. In this case, run the Seal-Tight between the 2001TRB and the siren controller.

Transformer Wiring

Transformer Primary	(2 ea.) 10 AWG, CU, stranded, black 40 inches in length.
Rectifier Output	(1 ea.) 2 AWG, CU, Black, 30 inches in length–48 VDC Negative.
	(1 ea.) 2 AWG, CU, Red, 40 inches in length–48V DC Positive.
Control Cabinet	(1 ea.) 14 AWG, CU, stranded, black 60 inches in length–120 VAC Line
	(1 ea.) 14 AWG, CU, stranded, white 60 inches in length–Neutral

1. The (2 ea.) 40 inches black 10 AWG lines provide 208/220/240 VAC for transformer primary input.
2. The 60 inches black, and the 60 inches white provide the AC input to the control cabinet. These wires will pass through the transformer as a raceway then be routed into the control cabinet unless the X4 and X5 taps are used in the 2001TRB (refer to Figure 9 Typical DCFCB or DCFCTB with 2001TRB Installation Drawing, Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram for wiring details).
3. The 30 inches black 2-AWG line provides the 48 VDC negative to the DCB control cabinet. It connects the terminal block in the 2001TRB labeled "-" and the 5/16 inch ground stud on the backplane of the siren controller.
4. The 40 inches red 2 AWG line provides 48 VDC positive voltage to the DCB control cabinet. It connects to the terminal block in the 2001TRB labeled "+" and to the labeled terminal (#3) at K3.

AC Line Wire Terminations

240 VAC operation	**Service disconnect**	**Transformer**
Transformer Primary: 2 ea. #10 black wires	L1	H1
	L2	H4

220 VAC operation	Service disconnect	Transformer
Transformer Primary: 2 ea. #10 black wires	L1	H1
	L2	H3

208 VAC operation	Service disconnect	Transformer
Transformer Primary: 2 ea. #10 black wires	L1	H1
	L2	H2

115 VAC Tap	Service disconnect	Transformer
Transformer Secondary		X4
		X5

NOTE A: Cap all unused taps with wire nuts

NOTE B: When using the model 2001TRB it is also necessary to provide a 120 VAC power source to provide power to the battery chargers. If 120 VAC is not available refer to Model -240B (Stepdown Transformer) section on page 81.

Figure 18 Transformer Rectifier Wiring to Control Unit

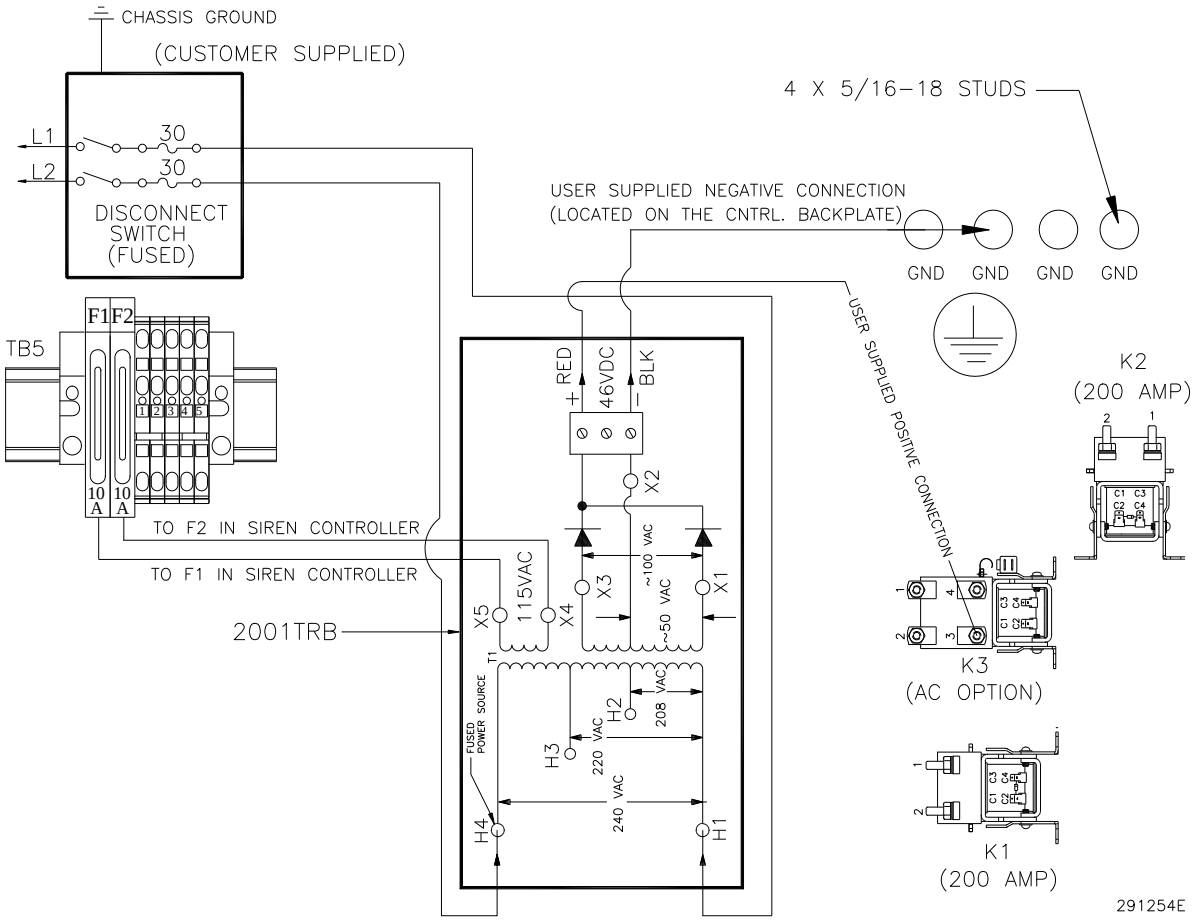
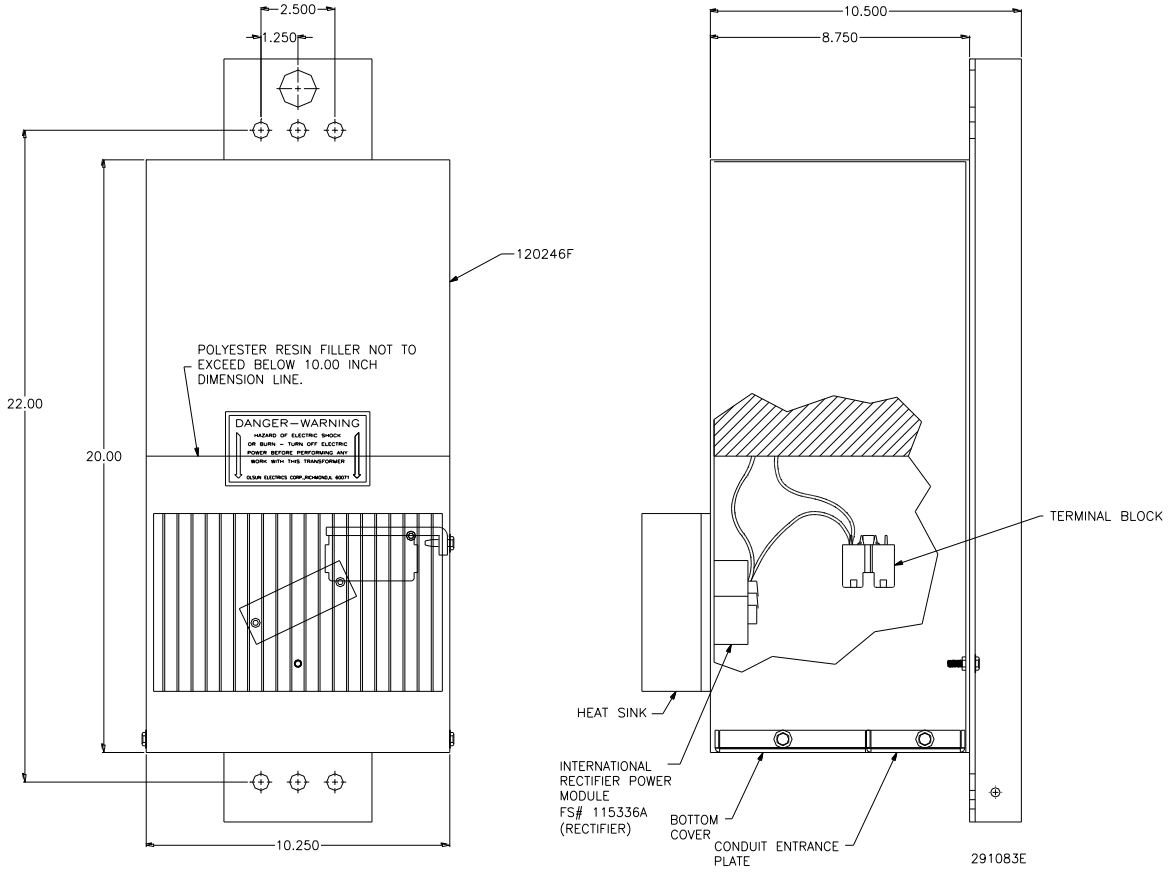


Figure 19 2001TRB Transformer Rectifier Parts List



Model -240B (Stepdown Transformer)

This option allows the Control Unit's battery charger to operate when only 240 VAC power is available. The unit provides a 115 VAC output.

⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, only experienced electricians should install this product in accordance with national and local electrical codes.

-240B Mounting Location

The transformer is located at the bottom of the control cabinet. It is pre-wired to a DIN mounted terminal block at the lower right side of the cabinet.

-240B Specifications

Input Voltage	230 VAC, 50-60 Hz,
	single phase
Output Voltage	115 VAC, 50-60 Hz,
	single phase 0.75 KVA

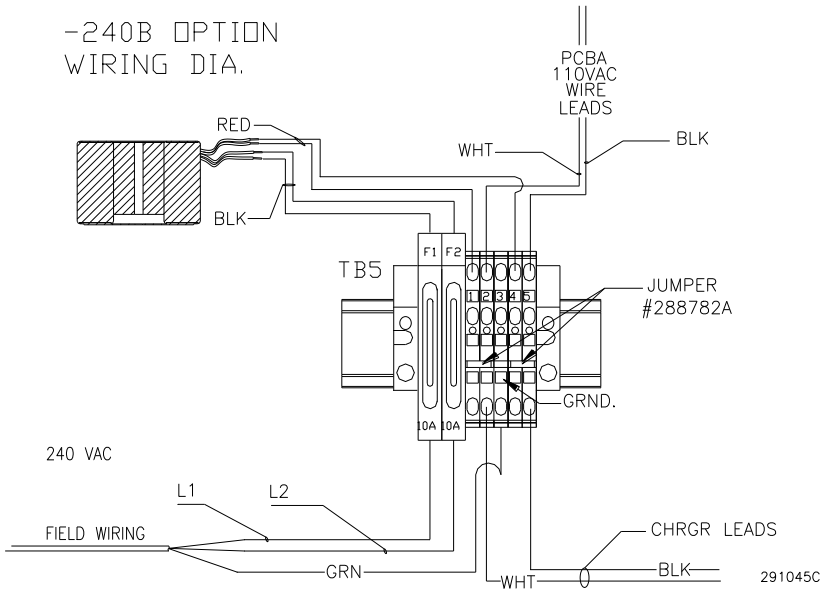
-240B Wiring

⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, only experienced electricians should install this product in accordance with national and local electrical codes.

When this option is ordered, the primary of the step down transformer is factory wired to F1 and F2. The 120 VAC secondary is connected to TB5. This option is not required if the 2001TRB option is used.

Figure 20 Stepdown Transformer Connections



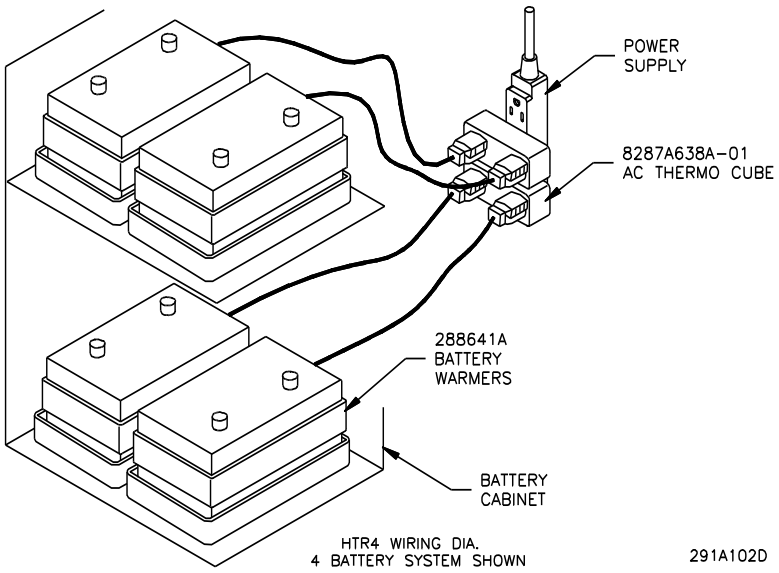
1. Use 14 AWG or larger wire (refer to Figure 20 Stepdown Transformer Connections and Figure 10 DCFCTB Wiring Diagram, Figure 11 DCB Wiring Diagram, or Figure 12 DCFCB Wiring Diagram for wiring details). Connect L1 from the fused disconnect to F1 on the DIN rail in Control Unit utilizing black wire.
2. Connect L2 from the fused disconnect to F2 on the DIN rail in Control Unit again using black wire.

3. Connect Ground (green wire) from fused disconnect to the green ground block on the DIN rail in the Control Unit. Push a small screwdriver into the square opening in the terminal block to open the contacts of this block.
4. Follow the instructions included with the lightning protector (supplied) and install in the service disconnect.
5. Size the fuse or circuit breaker in the service disconnect to 15 Amps maximum.

Model HTR2 and HTR4 (Battery Warmers)

In locations where temperatures may drop below freezing for extended periods, the optional battery warmers are recommended to maintain battery efficiency. A thermostat provides on-off control of the warmers that senses the inside temperature of the battery cabinet. The battery warmer option is equipped with four (4) battery warmers that are wrapped around each of the four (4) batteries in the battery cabinet. The warmers are plugged into the cube taps, which plug into the thermostat cube, which is plugged into a 120 VAC outlet that is provided for in the battery box. No other connection or mounting is required for this option.

Figure 21 HTR2 and HTR4 Wiring Diagram



⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, only experienced electricians should install this product in accordance with national and local electrical codes.

Model 2001HR (Holding Relay)

This option enables the control of both of the siren motors from a single contact closure on one-way models. This feature is typically required for telephone line control systems and is only required if an FC is not purchased. The 2001HR is a holding relay, which holds the rotator motor on for 15 seconds after the control contact is released, keeping siren rotation active during Wail signals. The control contact is wired between K2-C1 and ground.

Solar Power

When purchased, the solar option allows the siren to operate in areas where DC power is not available. Our PVS2110-48 and PVS220W-48 models for the DCFCB and DCFCTB controllers include a solar regulator and the solar panel kit. When installed, the batteries are charged by the photovoltaic charging system, in lieu of a battery charger, to provide operational power to the siren. Refer to Figure 22 DCFCTB Solar Wiring on page 85 and Figure 23 DCB and DCFCB Solar Wiring on page 86.

Figure 22 DCFCTB Solar Wiring

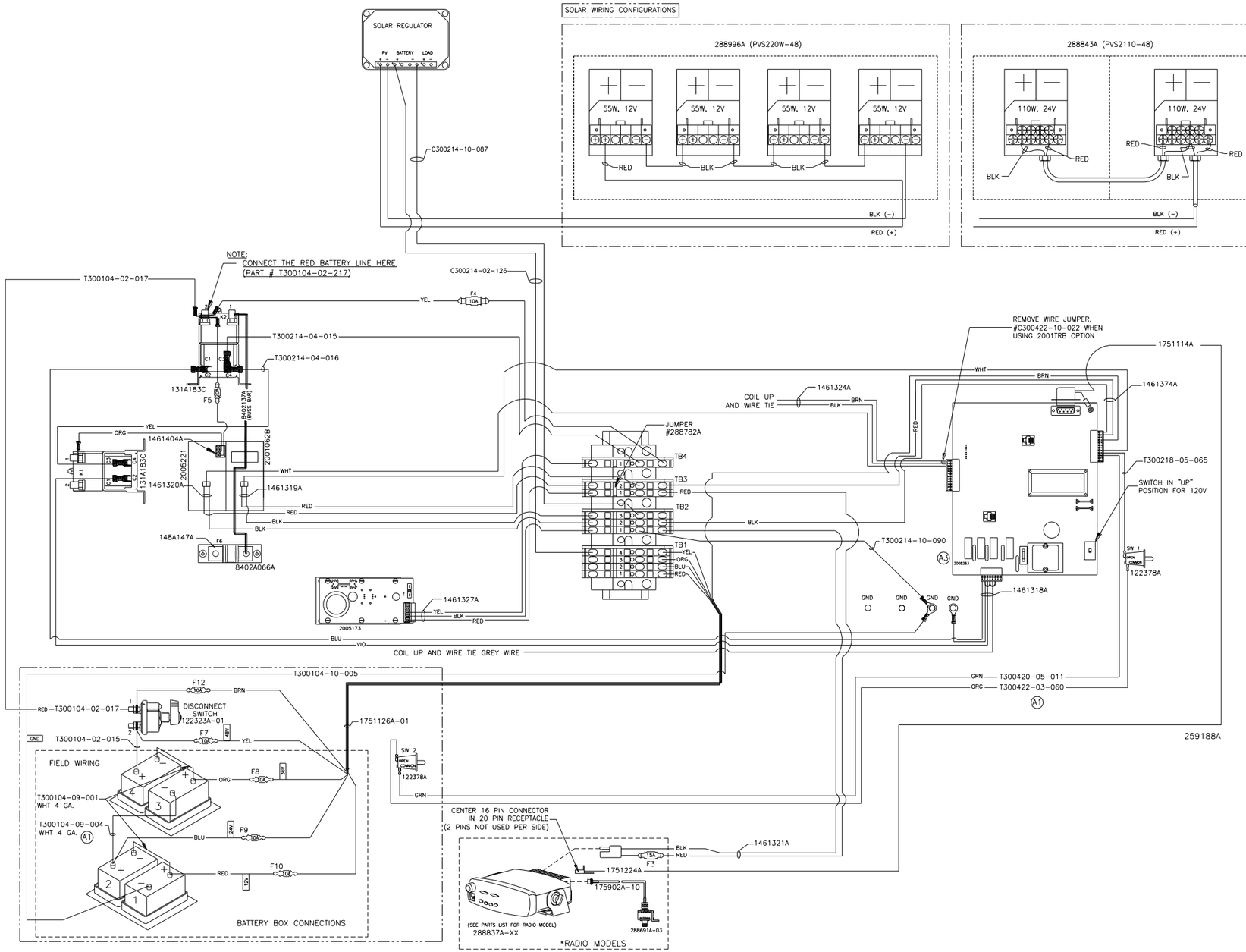
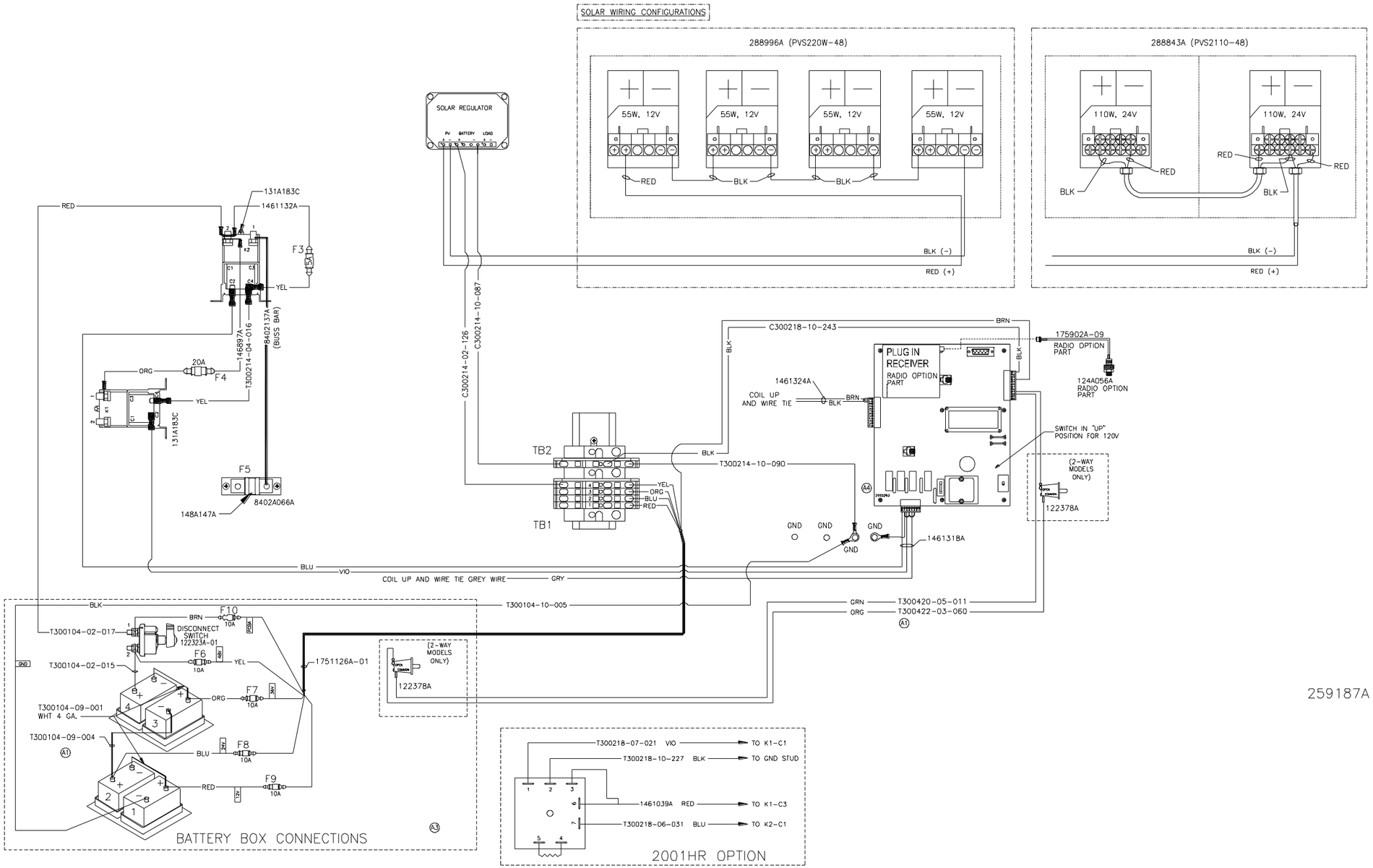


Figure 23 DCB and DCFCB Solar Wiring



259187A

Model DCFCTBD-IP

General

The DCFCTBD-IP combines the characteristics of a DCFCTBD with Serial to Ethernet conversion capabilities. This allows serial devices to communicate over an Ethernet network and provides audio decoding of digitized audio sent over the network.

The converter is configured with its own fixed IP address and port number. When packets of data are received over the Ethernet port that are addressed to the board's IP and port number, they are converted to serial data and sent out over the serial port. Likewise, any data coming into the serial port is converted to TCP/IP data packets and sent out over the Ethernet port to the server's IP address. The unit also contains a digital to analog converter. This allows specially configured incoming data packets to be converted to audio, which is then filtered and sent out over a 600 ohm audio port.

Ethernet Board Specifications

Electrical	
Input Voltage	10.5- 95 VDC
Current Draw	<150 mA
Serial Port	
Serial Port Protocol	RS232C, N, 8, 1 baud rate configurable
Ethernet Port	
Protocol	IEEE 802.3, 10 Base-T connection
600 Ohm Audio Output Port	
Protection	MOV and Transorb surge protection
Impedance	600 ohms
Audio Output Level	Adjustable from 0.30 to 3.00 V_{p-p}, (-17 dB to +2.7 dB) into 600 ohms

Connectors

JP1	**600 Ohm Audio Output Port**
	Balanced line output.

JP2	**JTAG Emulation port**

JP3	**Audio Output Expanded or Flat Selection Jumper**
	Jumpers pins 1 and 2 for flat audio output.
	Jumpers pins 2 and 3 for expanded dynamic range audio output

JP4	RS232 Serial Port
	1 -
	2 -
	3 - Ground, 0.5 Amps maximum current capacity
	4 - Radio transmit data from PC, standard RS232 levels
	5 - Radio receive data to PC, standard RS232 levels
	6 - Ground, 0.5 Amps maximum current capacity

JP5	FLASH Programming and Converter Configuration Port
	1 -
	2 - TX Data, standard RS232 levels
	3 - RX Data, standard RS232 levels
	4 - Ground
	5 - Serial Clock input for FLASH programming, standard RS232 levels
	6 - Processor Reset Not line, used in programming FLASH, 10K pull-up

JP6	10.5-95 VDC Power Input
	1 - (-)
	2 - (+)

JP7	Resets board back to factory default settings.

J1	Ethernet Network Port
	1 and 2 - Transmit data pair, balanced line
	3 and 6 - Receive data pair, balanced line
	4, 5, 7, 8 - AC coupled ground

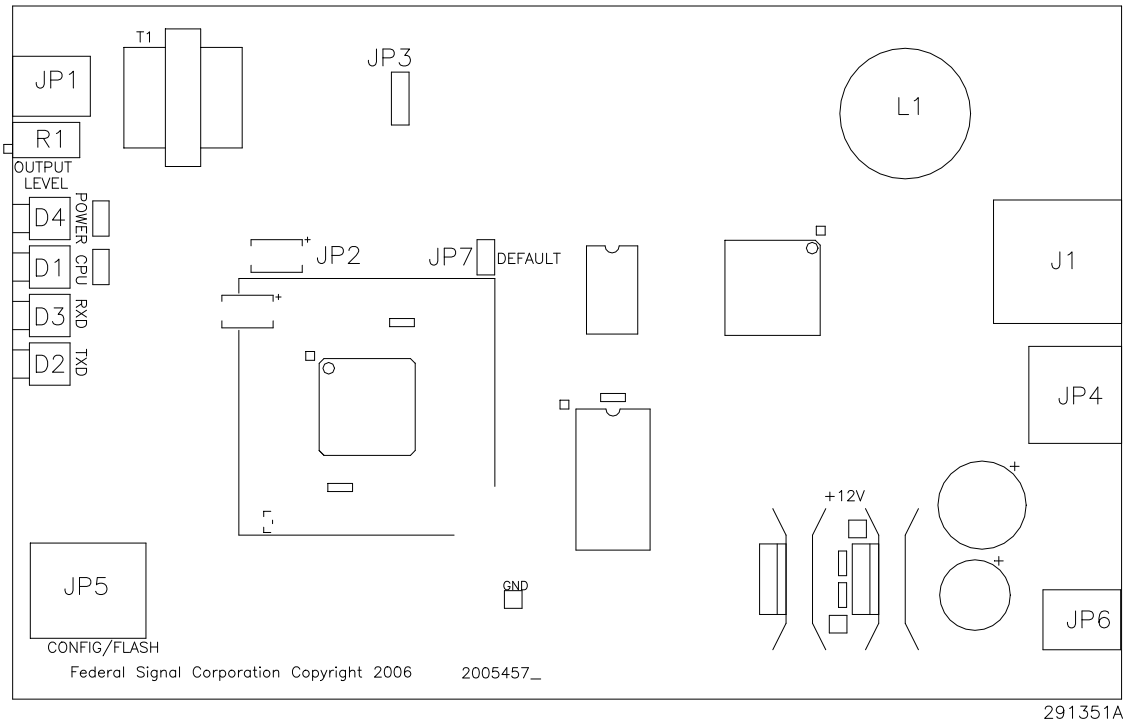
Indicators	
D1	CPU Heartbeat indicator, green
D2	Transmit data indicator, red
D3	Receive data indicator, yellow
D4	Power indicator, green

Controls	
R1	600 ohm audio output level set

Environmental	
Operating Temperature	-30°C - +65°C
Humidity	0-95% non-condensing

Physical	
Dimensions	~ 2 inches height, 4 inches width, 6.5 inches length.
Weight	< 2 lbs

Figure 24 Serial to Ethernet Board



Network Information

Protocols Supported

- TCP/IP
- UDP (optional)
- XML (optional)
- XMPP (optional)

IP Ports Used

- 16,887 (Codespear TCP/IP)
- 80 (HTTP)
- 3100 (optional UDP Serial Over IP)
- 3101 (optional UDP Voice Over IP)

IP Address

User selectable

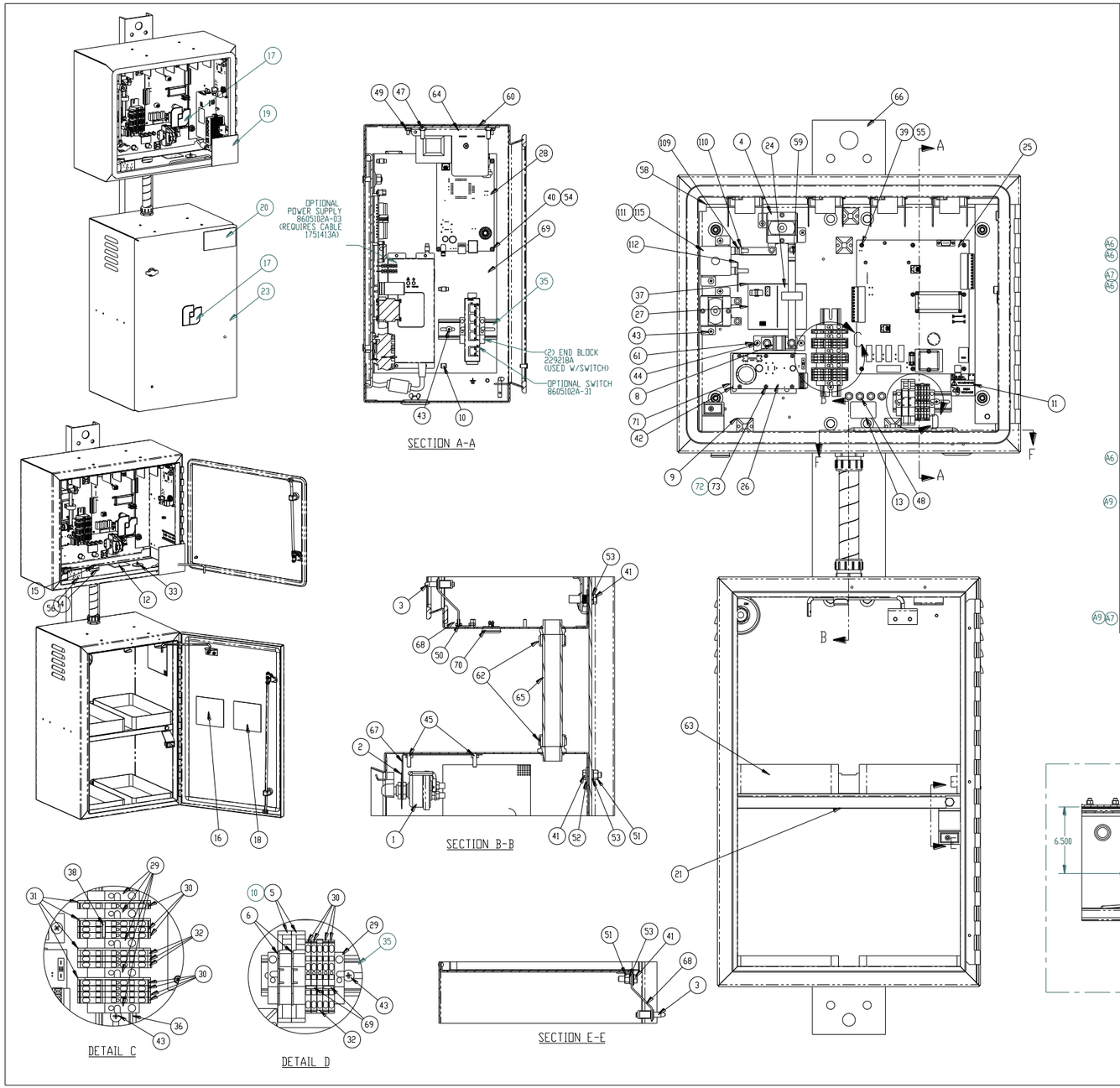
TOS/DSCP (Type of Service)

User selectable

Bandwidth Requirements

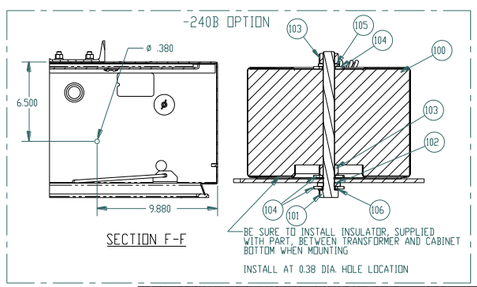
Voice Over IP	150K baud per connection
Siren Activation	50 bytes per connection
Siren Poll Response	74 bytes per connection

Figure 25 DCFCTB-IP Final Assembly



ITEM NO.	QTY.	PART NO.	DESCRIPTION	ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	122323A-01	SWITCH,DISCONNECT	59	1	8402137A	BUSS BAR, FCT OFFSET MODEL
2	1	122323A-02	FACE PLATE,DISCONNECT SWITCH	60	1	8402149A-01	BRACKET,MTG,CHARGER W/PEMS
3	2	122378A	SWITCH, INTRUSION, SPDT	61	1	8402A066A	FUSE BLOCK ASSEMBLY
4	2	131A182C	CONTACTOR, 48V, 200A	62	2	8402A068A	FITTING,1" CONDUIT,CARLON
5	2	143139A	FUSE LEVER,35MM DIN MT	63	4	8402A070A-01	TRAY,BATTERY,LARGE
6	2	143140A	FUSE COVER,ZAPTNHCZS125	64	4	8402B073C	CHARGER ASSEMBLY, 13VDC, 3A
7	2	148154A	FUSE, 10 AMP,TIME DELAY	65	1	8581025A	1" COND,LIQUI-TITE,7.5'
8	1	148A147A	FUSE, 200A	66	1	8600106C	CHANNEL,MTG,CABINET
9	7	150A130	CABLE TIE MOUNT	67	1	8600116A	BRACKET,MTG,SWITCH,DISCONNECT
10	4	150174	CABLE TIE MOUNT, HOLE MOUNT	68	2	8600118B	BRACKET,INTRUSION SWITCH
11	1	1611639B	LABEL, HIGH VOLTAGE, L1, L2	69	1	8605101A-01	BRKT ASSY,CABINET,SIDE MOUNT,DC
12	1	1612400A	LABEL, FC CNTRLS,DIN RAIL,120V	70	1	231208A	PLUG,HOLE,0.88" DIA.
13	1	1612403A	LABEL,GROUND SYMBOL	NT SHWN	1	8549A178A	ACCESSORY KIT,DESICANT (A3)
14	1	1612423A-82	LABEL,FC CNTL,SERIAL NUMBER	NT SHWN	1	8549A193A	LIGHTNING PROTECTOR
15	1	1612423A-83	LABEL,FC CNTL,DCFCTBD-IP	NT SHWN	34	150A109	WIRE TIE
16	1	161608A	LABEL, WARNING, BATTERIES	*	5	8568044A	MARKER,TERMINAL BLOCK
17	2	161693A	LABEL,FS LOGO	*	1	1461318A	WIRE ASSY,PCB,8-PDS
18	1	161767A	LABEL,BATTERY WARNING	*	1	1461319A	WIRE ASSY,PCBA SENSOR
19	1	161A509A	LABEL, WARNING, CNTRL	*	1	1461320A	WIRE ASSY,PCBA SENSOR
20	1	161A510A	LABEL,WARNING,BATTERY BOX	*	1	1461323A	WIRE ASSY,10A FUSED
21	1	161B511A	LABEL,DANGER,BATTERY SHELF	*	1	1461324A	WIRE ASSY,PCB TO RELAY
(A6) 22	1	170345D	CABINET,CONTROL,ALUMINUM	*	1	1461327A	WIRE LEAD,DC TO DC,5-PDS
(A6) 23	1	170346D	CABINET,BATTERY,ALUMINUM	*	1	1461361A	WIRE ASSY,PCB 110V PWR.
24	1	2001062B	PCBA, CURRENT SENSOR	*	1	1461374A	WIRE ASSY,PCB,12-PDS
(A7) 25	1	2005263B	PCBA,FCM PLUS	*	1	1461389A	WIRE HARNESS,BATTERY CHARGER
(A6) 26	1	2005173D	PCBA,DC TO DC CONVERTER BOARD	*	1	1461404A	WIRE ASSY,ROTATOR SENSOR/FUSED
27	1	2005221A	PCBA, CURRENT SENSOR	*	1	175106A-04	CABLE,AC,W/FERRULES
28	1	2005457C	PCBA,SERIAL TO ETHERNET CONVERTER	*	1	1751126A-01	CABLE,BATTERY CHARGER,48VDC
29	7	229218A	BRKT,T,BLOCK END	*	1	1751186B	CABLE,6-COND,MODULAR,1 TO 6
30	12	229282A	TERM BLOCK,1-POLE,35MM DIN	*	1	C300218-02-214	C-WIRE,29",RED
31	4	229283A	CAP,END,TERM BLK,1 P.	*	1	C300218-09-119	C-WIRE,4",WHITE
32	4	229288A	GROUND TERM. BLOCK, 3-PDS, 35MM DIN	*	1	C300218-10-258	C-WIRE,4",BLACK
33	1	231194A	PLUG,HOLE,1.38,SS	*	1	C300218-10-270	C-WIRE,29",BLACK
34	2	288782A	JUMPER, ZQV 2.5, 1/2	*	1	T300104-02-015	T-WIRE,12",RED
35	2	288810A-04	DIN RAIL,ALUM,UNCDATED,4.00"	*	1	T300104-02-017	T-WIRE,38",RED
36	1	288810A-06	DIN RAIL,ALUM,UNCDATED,6.00"	*	2	T300104-09-001	T-WIRE,13",WHITE
37	1	288B229A-06	SNAP TRACK, 4"	*	1	T300104-09-004	T-WIRE,30",WHITE
38	1	288I074A	JUMPER,TERM. BLOCK,3 PDS.	*	1	T300104-10-005	T-WIRE,38",BLACK
39	8	7000444A-05	SCREW,MACH,PHIL,4-40 X 5/16	*	1	T300214-04-015	T-WIRE,10",YELLOW
40	4	7000A427-06	SCREW,6-32 X 3/8" PHIL HD,S.S.	*	1	T300214-04-016	T-WIRE,8",YELLOW
41	11	7002A009-16	BOLT,HEX HD,SS,3/8-16 X 1	*	1	T300214-10-090	T-WIRE,6",BLACK
(A6) 42	4	7011A041-06	SCREW,THRD FORM,PAN HD,PHIL,TYPE B,#6	*	1	T300218-05-064	T-WIRE,63",GREEN
43	14	7011A069-08	SCR, PAN HD., #8 THD. FRM.	*	1	T300218-05-065	T-WIRE,44",GREEN
44	2	7011A101-12	SCR, PAN HD., #8 THD. FRM.	*	1	T300420-05-011	T-WIRE,89",GREEN
45	2	7058050A	NUT,MACH SCR,KEPS,1/4-20	NT SHWN	1	255360J	MANUAL,DCB, DCFCB, & DCFCTB (A9) (A7)
(A9) 46				NT SHWN	REF	259230A	WIRING DIA,BROADBAND,DCFCTBD-IP
47	4	7058055A	NUT, ELASTIC STOP, HEX, 1/4-20,SS	NT SHWN	1	8500863A	TEST DATA SHEET
48	6	7058A033	NUT,MACH SCR,KEPS,5/16-18	NT SHWN	REF	85008618	TEST PROC,BROADBAND,DCFCTBD-IP
49	16	7058A045	NUT, KEPS, SS, 8-32	NT SHWN	REF	85001138A	INSPECTION SHEET
50	3	7058A047	NUT,MACH SCR,KEPS,10-32	NT SHWN	1	255373A (A4)	MANUAL,SE2000,2005457,SERIAL TO ETHERNET
51	11	7059A063	NUT, 3/8-16	NT SHWN	REF	85001342A (A5)	TEST DATA SHEET,SE2000,2005457
52	10	7072A035	FLT. WSHR., SS, 3/8	71	1	169182A-01	PLATE ASSEMBLY, DC-DC CONVERTER (A6)
53	15	7074A046	LKWSHR, SPLT, SS, 3/8	72	6	230286A	SPACER,.25 HEX,6-32X.375,NYLON (A6)
54	4	7075A011	WASHER, INT TTH, #6	73	6	7000A427-04	SCREW,6-32 X 1/4" PHIL HD,S.S. (A8) (A6)
55	8	7075080A	LOCKWASHER, INT TOOTH FOR #4 SCREW				
56	1	81461530A	LABEL, WARNING, HIGH VOLTAGE				
(A9) (A7) 57							
58	1	8402136A-01	BACKPLATE, WITH 4-40 STANDOFFS				

* SHOWN ON WIRING DIAGRAM


-240B OPTION
Ø .380
6.500
9.880
SECTION F-F
BE SURE TO INSTALL INSULATOR, SUPPLIED WITH PART, BETWEEN TRANSFORMER AND CABINET BOTTOM WHEN MOUNTING
INSTALL AT 0.38 DIA. HOLE LOCATION

OPTIONAL PARTS -240B KIT

100	1	120833A	TRANSFORMER W/INSULATOR
101	1	7002080A-72	SCREW,HEX,3/8-16 X 4.5,S.S.
102	1	7072253A	WASHER,3/8,NEOPRENE
103	2	7059A063	NUT,3/8,S.S.
104	3	7072A035	FLAT WASHER,3/8,S.S.
105	1	7074A046	LKWASHER,SPLIT,3/8,S.S.
106	1	7075066A	LKWASHER,INT.TTH,3/8
107	1	1612422A	LABEL,240VAC,REPLACES 1612400
108	1	1612423A-81	LABEL,-240B OPTION

OPTIONAL PARTS 2001TRB KIT

109	1	8402109A	BUSS BAR,DN 131A182C
110	1	8402138A	BUSS BAR,RELAY TO RELAY
111	1	131A182C	48V CONTACTOR
112	1	1612399A	LABEL,2001TRB ALERT
(A7) 113			
(A7) 114			
NT SHN	1	120246F	TRANSFORMER/RECTIFIER
*	1	146113A	WIRE,FUSED,CONTACTOR
115	2	7011A069-08	SCREW,PAN HD,PHIL,#8
NT SHN	1	2561831A	INSTRUCTION SHEET

REV	CHANGE	DATE	BY
A9	SEE ECR #09-5888	12/30/09	VT
A8	SEE ECR #09-5201	10/5/09	MAF
A7	SEE ECR #09-4970	7/2/09	MAF
A6	SEE ECR #09-4775	5/20/09	MAF
A5	SEE ECO #08-4012	1/22/08	MAF
A4	SEE ECO #08-4002	1/8/08	MAF
A3	SEE ECO #07-4127	9/10/07	MAF
A2	SEE ECO #07-4083	6/11/07	MAF

Tolerances Unless Otherwise Specified
Angles ------- ±0.5°
X.XX ------- ±0.015
X.XXX ------- ±0.005

SIGNAL DIVISION
Federal Signal Corporation
2645 FEDERAL SIGNAL DRIVE - UNIVERSITY PARK,IL 60484

FINISH: N/A
REMOVE BURRS, SHARP CORNERS AND EDGES
MATERIAL: N/A
UNIT OF MEASURE:
NAME: FINAL ASSY,BROADBAND, DCFCTBD-IP

MATERIAL DESCRIBED AND INFORMATION CONVEYED IS PROPRIETARY TO FEDERAL SIGNAL CORPORATION IS OR MAY BE THE SUBJECT OF PATENT APPLICATIONS, AND MAYNOT BE COPIED, DIVULGED TO OTHERS, OR USED FOR MANUFACTURING WITHOUT CONSENT.

DRAWN BY: MAF DATE: 4/12/07
CHKD BY: SC DATE: 5/10/07
SCALE AT 'D' SIZE: NONE
DRAWING NUMBER: 8605100A

Figure 26 DCFCTB-IP Wiring Diagram

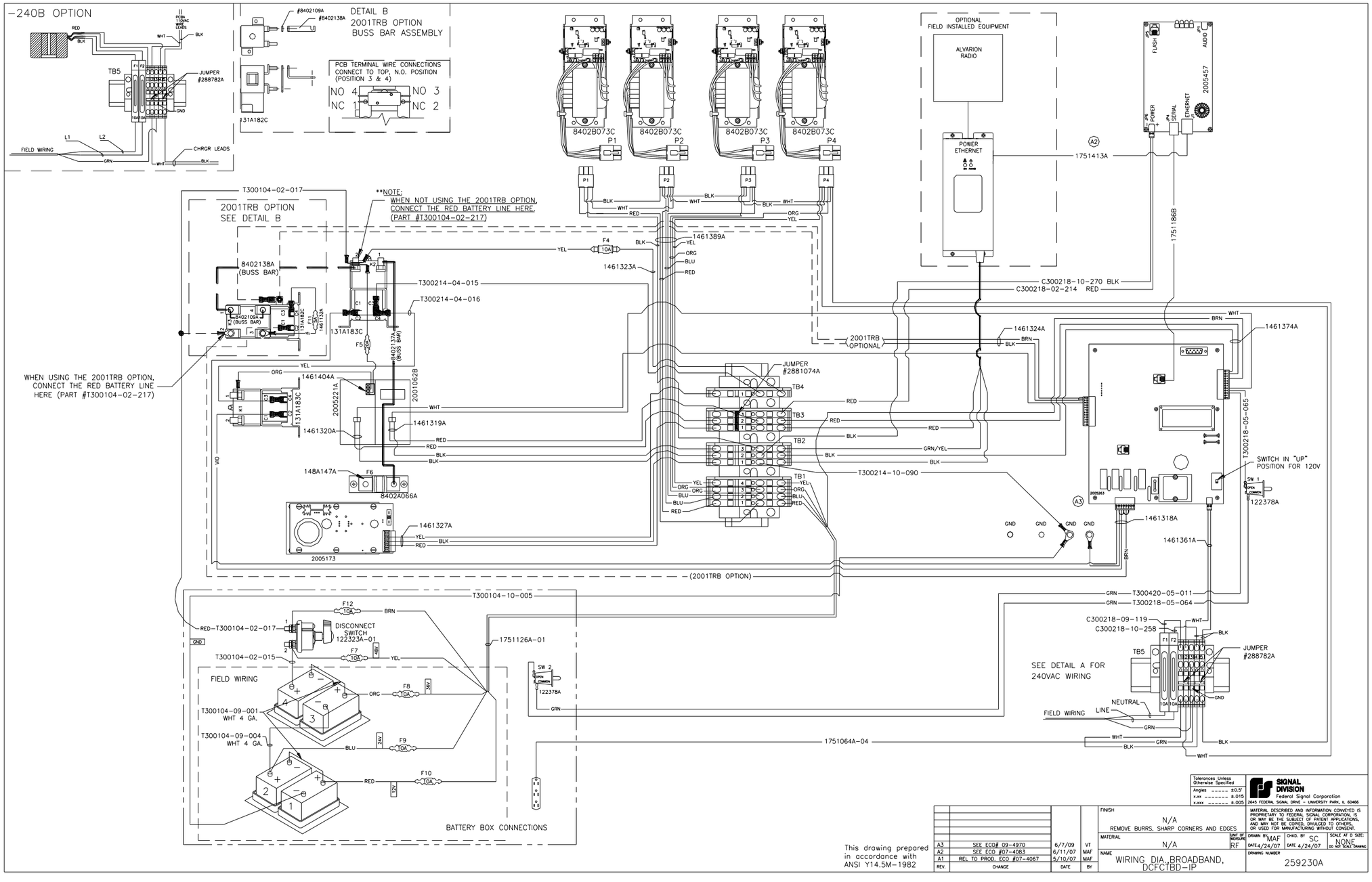
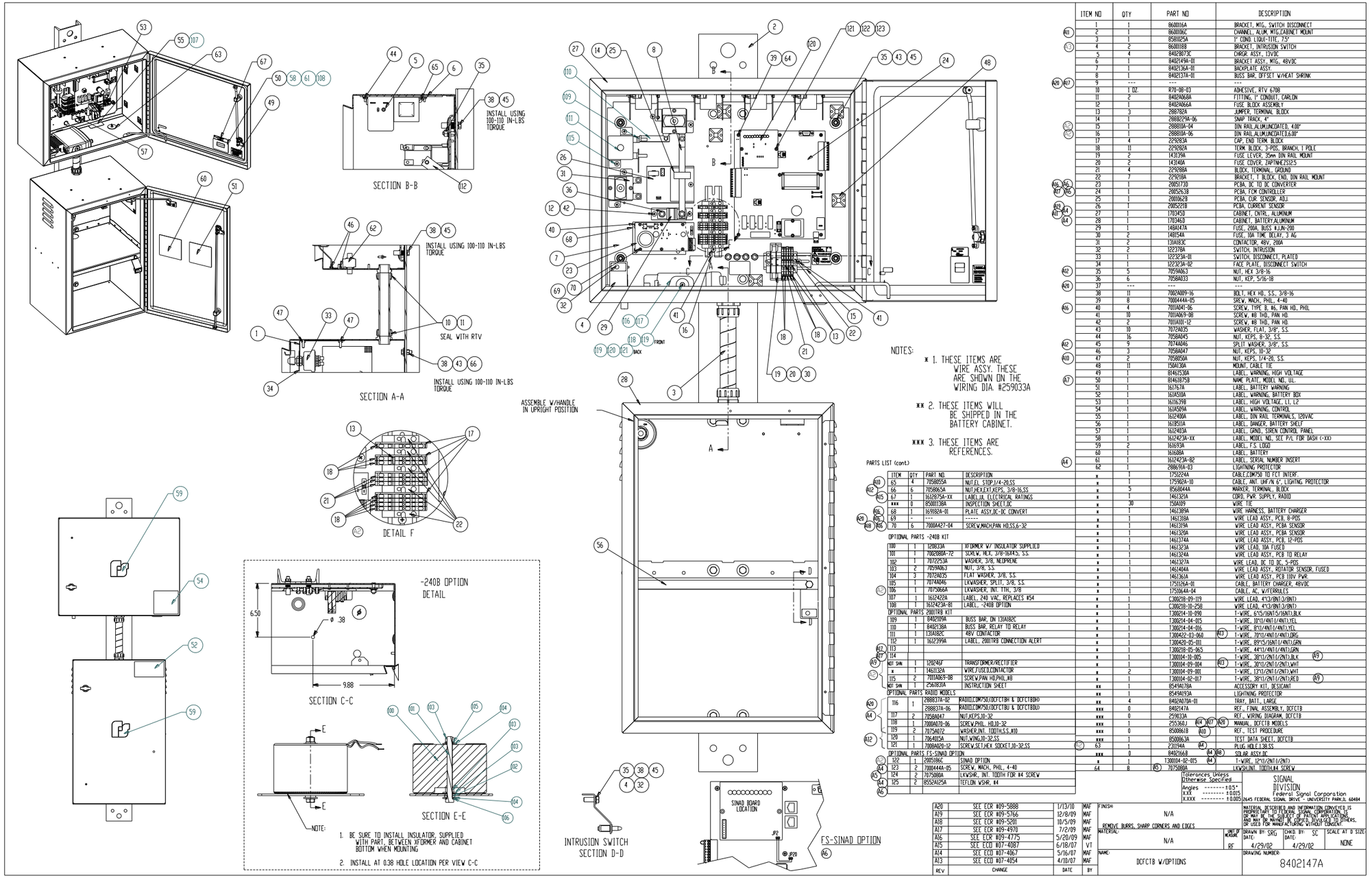


Figure 27 DCFCTB Final Assembly


SECTION B-B
INSTALL USING 100-110 IN-LBS TORQUE
SECTION A-A
INSTALL USING 100-110 IN-LBS TORQUE
SEAL WITH RTV
INSTALL USING 100-110 IN-LBS TORQUE
DETAIL F
-240B OPTION DETAIL
SECTION C-C
SECTION E-E
NOTE:
1. BE SURE TO INSTALL INSULATOR, SUPPLIED WITH PART, BETWEEN XFORMER AND CABINET BOTTOM WHEN MOUNTING
2. INSTALL AT 0.38 HOLE LOCATION PER VIEW C-C
ASSEMBLE W/HANDLE IN UPRIGHT POSITION
INTRUSION SWITCH SECTION D-D
SINAD BOARD LOCATION
FS-SINAD OPTION
NOTES:
* 1. THESE ITEMS ARE WIRE ASSY. THESE ARE SHOWN ON THE WIRING DIA. #259033A
** 2. THESE ITEMS WILL BE SHIPPED IN THE BATTERY CABINET.
*** 3. THESE ITEMS ARE REFERENCES.

ITEM NO	QTY	PART NO	DESCRIPTION
1	1	8600116A	BRACKET, MTG, SWITCH DISCONNECT
2	1	8600126C	CHANNEL, ALUM, MTG,CABINET MOUNT
3	1	8581025A	1" COND. LIQUI-TITE, 75"
4	2	8600118B	BRACKET, INTRUSION SWITCH
5	4	8402807JC	CHRGR ASSY., 13VDC
6	1	8402149A-01	BRACKET ASSY., MTG, 48VDC
7	1	8402136A-01	BACKPLATE ASSY.
8	1	8402137A-01	BUSS BAR, OFFSET W/HEAT SHRINK
9	---	---	---
10	1 OZ.	878-08-03	ADHESIVE, RTV 6708
11	2	8402A068A	FITTING, 1" CONDUIT, CARLON
12	1	8402A066A	FUSE BLOCK ASSEMBLY
13	3	288782A	JUMPER, TERMINAL BLOCK
14	1	288822SA-06	SNAP TRACK, 6"
15	1	288810A-04	DIN RAIL,ALUMUNDATED, 4.00"
16	1	288810A-06	DIN RAIL,ALUMUNDATED,6.00"
17	4	2292B3A	CAP, END TERM BLOCK
18	11	2292B2A	TERM BLOCK, 3-POS, BRANCH, 1 POLE
19	2	143139A	FUSE LEVER, 2cm DIN RAIL MOUNT
20	2	143140A	FUSE COVER, ZAPTHHEZS125
21	4	2292B8A	BLOCK, TERMINAL, GROUND
22	7	2292B9A	BRACKET, T BLOCK END, DIN RAIL MOUNT
23	1	28051730	PCBA, DC TO DC CONVERTER
24	1	28052638	PCBA, FCM CONTROLLER
25	1	28010628	PCBA, CUR SENSOR, ADJ.
26	1	28052201B	PCBA, CURRENT SENSOR
27	1	1703425D	CABINET, CNTRL, ALUMINUM
28	1	1703446D	CABINET, BATTERY,ALUMINUM
29	1	148A147A	FUSE, 200A, BUSS #JJN-200
30	2	140154A	FUSE, 10A TIME DELAY, 3 AG
31	2	13A183C	CONTACTOR, 48V, 200A
32	2	122378A	SWITCH, INTRUSION
33	1	122323A-01	SWITCH, DISCONNECT, PLATED
34	1	122323A-02	FACE PLATE, DISCONNECT SWITCH
35	5	7059A063	NUT, HEX 3/8-16
36	6	7058A033	NUT, KEP, 5/16-18
37	---	---	---
38	11	7082A089-16	BOLT, HEX HD, S.S., 3/8-16
39	8	7080A44A-05	SCREW, MACH, PHIL, 4-40
40	4	7011A047-06	SCREW, TYPE B, #6, PAN HD., PHIL
41	10	7011A069-08	SCREW, #8 THD., PAN HD.
42	2	7011A101-12	SCREW, #8 THD., PAN HD.
43	18	7072A025	WASHER, FLAT, 3/8", S.S.
44	16	7058A045	NUT, KEPS, 8-32, S.S.
45	9	7074A046	SPLIT WASHER, 3/8", S.S.
46	3	7058A047	NUT, KEPS, 10-32"
47	2	7059B58A	NUT, KEPS, 1/4-20, S.S.
48	11	150A130A	MOUNT, CABLE TIE
49	1	81461530A	LABEL, WARNING, HIGH VOLTAGE
50	1	8146187SB	NAME PLATE, MODEL NO., UL.
51	1	161767A	LABEL, BATTERY WARNING
52	1	161A518A	LABEL, WARNING, BATTERY BOX
53	1	16116398	LABEL, HIGH VOLTAGE, L1, L2
54	1	161A509A	LABEL, WARNING, CONTROL
55	1	1612408A	LABEL, DIN RAIL TERMINALS, 120VAC
56	1	1618D1A	LABEL, DANGER, BATTERY SHELF
57	1	1612403A	LABEL, GRND., SIREN CONTROL PANEL
58	1	1612423A-XX	LABEL, MODEL NO., SEE P/L FOR DASH (-)XX)
59	2	161693A	LABEL, F.S. LOGO
60	1	161608A	LABEL, BATTERY
61	1	1612423A-B2	LABEL, SERIAL NUMBER INSERT
62	1	28869A-03	LIGHTNING PROTECTOR
x	1	175224A	CABLE,CDMA750 TO FCT INTERF.
x	1	1759B2A-10	CABLE, ANT. UHF/N 6', LIGHTNG. PROTECTOR
x	5	8568044A	MARKER, TERMINAL, BLOCK
x	1	146321A	CORD, PWR. SUPPLY, RADIO
x	30	150A109	WIRE TIE
x	1	146389A	WIRE HARNESS, BATTERY CHARGER
x	1	146320A	WIRE LEAD ASSY., PCB, 16-PIN
x	1	146319A	WIRE LEAD ASSY., PCBA SENSOR
x	1	146320A	WIRE LEAD ASSY., PCBA SENSOR
x	1	146374A	WIRE LEAD ASSY., PCB, 12-POS
x	1	146323A	WIRE LEAD, 10A FUSED
x	1	146324A	WIRE LEAD ASSY., PCB TO RELAY
x	1	146327A	WIRE LEAD, DC TO DC, 5-POS
x	1	146408A	WIRE LEAD ASSY., ROTATOR SENSOR, FUSED
x	1	146136A	WIRE LEAD ASSY, PCB 110V PWR
x	1	1751126A-01	CABLE, BATTERY CHARGER, 48VDC
x	1	175106A-04	CABLE, AC, W/FERRULES
x	1	C300218-09-119	WIRE LEAD, 4"(3/8NT)-3/8NT)
x	1	C300218-10-258	WIRE LEAD, 4"(3/8NT)-3/8NT)
x	1	T300214-10-990	T-WIRE, 6"(5/16NT)-5/16NT),BLK
x	1	T300214-04-015	T-WIRE, 18"(1/4NT)-1/4NT),YEL
x	1	T300214-04-016	T-WIRE, 8"(1/4NT)-1/4NT),YEL
x	1	T300422-03-068	T-WIRE, 78"(1/4NT)-1/4NT),ORG
x	1	T300428-05-011	T-WIRE, 89"(5/16NT)-1/4NT),GRN
x	1	T300218-05-965	T-WIRE, 44"(1/4NT)-1/4NT),GRN
x	1	T300104-10-005	T-WIRE, 38"(1/2NT)-1/2NT),BLK
x	1	T300104-09-004	T-WIRE, 30"(1/2NT)-1/2NT),WHT
x	2	T300104-09-001	T-WIRE, 12"(1/2NT)-1/2NT),WHT
x	1	T300104-02-017	T-WIRE, 38"(1/2NT)-1/2NT),RED
xx	1	8549A178A	ACCESSORY KIT, DESICANT
xx	1	8549A193A	LIGHTNING PROTECTOR
xx	4	8402147BA-01	TRAY, BATT., LARGE
xxx	0	8402147A	REF., FINAL ASSEMBLY, DCFCTB
xxx	0	259033A	REF., WIRING DIAGRAM, DCFCTB
xxx	1	255360J	MANUAL, DCFCTB MODELS
xxx	0	8500861B	REF., TEST PROCEDURE
xxx	1	8500863A	TEST DATA SHEET, DCFCTB
63	1	231194A	PLUG,HOLE 1.38,SS
xxx	0	8402166B	SOLAR ASSY,DC
x	1	T300104-02-015	T-WIRE, 12"(1/2NT)-1/2NT)
64	8	7075B08A	LKWSHLNT, TOOTH,#4 SCREW

PARTS LIST (cont)			
ITEM	QTY	PART NO.	DESCRIPTION
65	4	7058B05A	NUT,EL STOP,1/4-20,SS
66	6	7058B05A	NUT,HEX,EXT,KEPS, 3/8-16,SS
67	1	16128275A-XX	LABEL,UL ELECTRICAL RATINGS
***	0	8500113BA	INSPECTION SHEET,DC
68	1	1619B2A-01	PLATE ASSY,BC-DC CONVERT
69	-	---	---
70	6	7080A427-04	SCREW,MACH,PAN HD,SS,6-32

OPTIONAL PARTS -240B KIT			
100	1	120B33A	XFORMER W/ INSULATOR SUPPLIED
101	1	7082B88A-72	SCREW, HEX, 3/8-16X4.5, S.S.
102	1	7072253A	WASHER, 3/8, NEOPRENE
103	2	7059A063	NUT, 3/8, S.S.
104	3	7072A025	FLAT WASHER, 3/8, S.S.
105	1	7074A046	LKVASHER, SPLIT, 3/8, S.S.
106	1	7075066A	LKVASHER, INT. TTH, 3/8
107	1	1612422A	LABEL, 240 VAC, REPLACES #54
108	1	16124C3A-B1	LABEL, -240B OPTION

OPTIONAL PARTS 2001TRB KIT			
109	1	8402109A	BUSS BAR, DN 13X182C
110	1	8402138A	BUSS BAR, RELAY TO RELAY
111	1	13A182C	48V CONTACTOR
112	1	1612399A	LABEL, 2001TRB CONNECTION ALERT
113			
114			
NOT SHN	1	129246F	TRANSFORMER/RECTIFIER
x	1	1461132A	WIRE,FUSED,CONTACTOR
115	2	7011A069-08	SCREW,PAN HD,PHIL.,#8
NOT SHN	1	2561B3JA	INSTRUCTION SHEET

OPTIONAL PARTS RADIO MODELS			
116	1	2988837A-B2	RADIO,CDM750,DCFCTBH & DCFCTB8H)
	1	288837A-B6	RADIO,CDM750,DCFCTBU & DCFCTB0U)
117	2	7058A047	NUT,KEPS,10-32
118	1	7000A070-06	SCREW,PHIL. HD,10-32
119	2	7072S4072	WASHER,INT. TOOTH,S.S.,#10
120	1	706-4015A	NUT,WING,10-32,SS
121	1	7008A020-12	SCREW,SET,HEX SOCKET,10-32,SS

OPTIONAL PARTS FS-SINAD OPTION			
122	1	28051986	SINAD OPTION
123	2	7080A44A-05	SCREW, MACH, PHIL, 4-40
124	2	7075088A	LKWSHR, INT. TOOTH FOR #4 SCREW
125	2	8552A125A	TEFLON WSHR, #4

REV	CHANGE	DATE	BY
A20	SEE ECR #09-5888	1/13/10	MAF
A19	SEE ECR #09-5766	12/8/09	MAF
A18	SEE ECR #09-5201	10/5/09	MAF
A17	SEE ECR #09-4970	7/2/09	MAF
A16	SEE ECR #09-4775	5/20/09	MAF
A15	SEE ECO #07-4087	6/18/07	VT
A14	SEE ECO #07-4067	5/16/07	MAF
A13	SEE ECO #07-4054	4/18/07	MAF

Tolerances Unless Otherwise Specified
Angles -------- ±0.5°
.XXX -------- ±0.015
.X.XXX -------- ±0.005

SIGNAL DIVISION
Federal Signal Corporation
2645 FEDERAL SIGNAL DRIVE * UNIVERSITY PARK,IL 60484

FINISH: N/A
REMOVE BURRS, SHARP CORNERS AND EDGES

MATERIAL: N/A
UNIT OF MEASURE: RF

DRAWN BY: SRG DATE: 4/29/02
CHK'D BY: SC DATE: 4/29/02
SCALE AT 'B' SIZE: NONE

NAME: DCFCTB W/OPTIONS
DRAWING NUMBER: 8402147A

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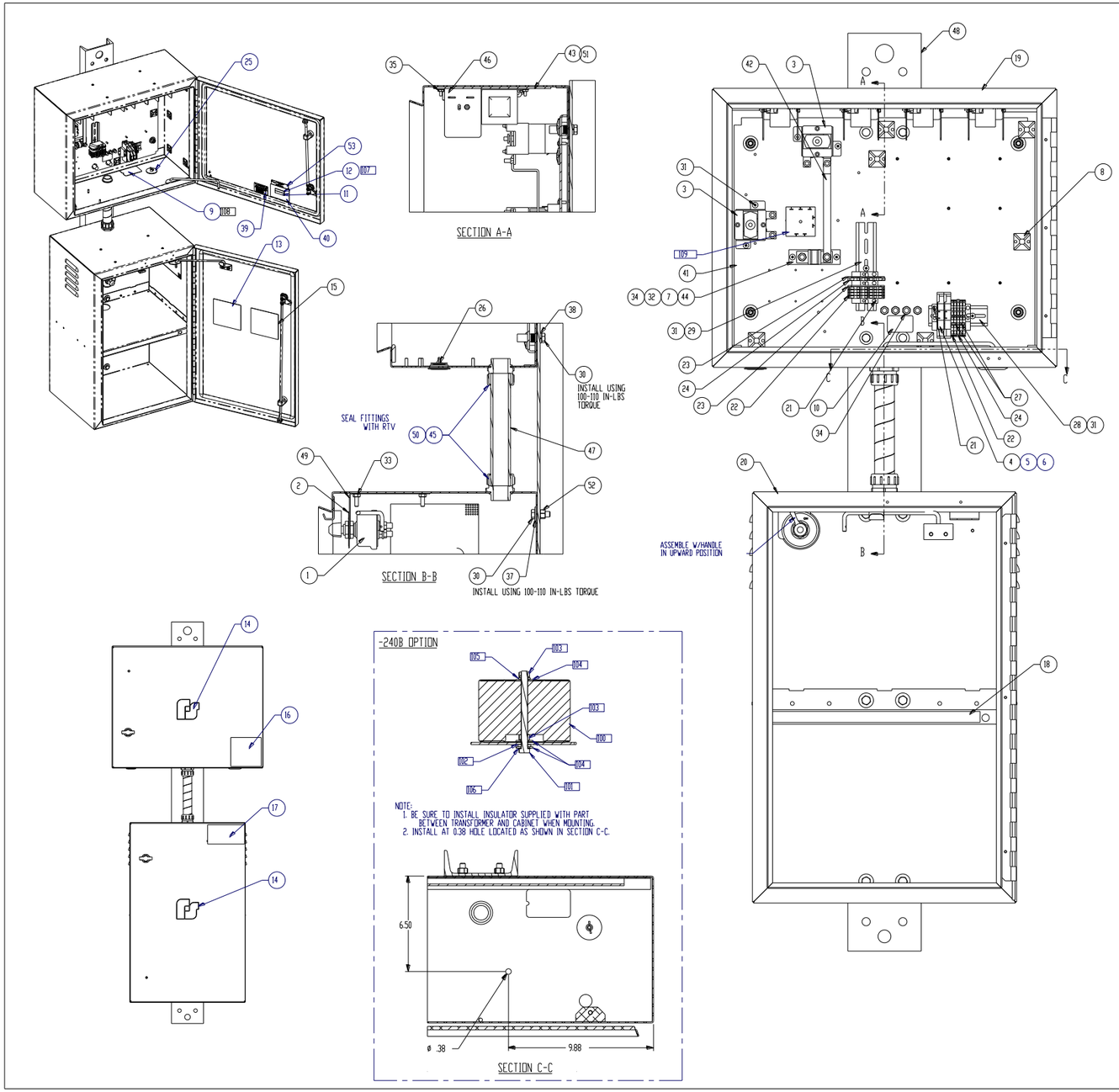
Figure 28 DCB Final Assembly


SECTION A-A
SECTION B-B
INSTALL USING 100-110 IN-LBS TORQUE
SEAL FITTINGS WITH RTV
INSTALL USING 100-110 IN-LBS TORQUE
ASSEMBLE W/HANDLE IN UPWARD POSITION
-240B OPTION
NOTE:
1. BE SURE TO INSTALL INSULATOR SUPPLIED WITH PART BETWEEN TRANSFORMER AND CABINET WHEN MOUNTING.
2. INSTALL AT 0.38 HOLE LOCATED AS SHOWN IN SECTION C-C.
6.50
ø .38
9.88
SECTION C-C

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	122323A-01	SWITCH,DISCONNECT
2	1	122323A-02	FACE PLATE,DISCONNECT SWITCH
3	2	121A183C	CONTACTOR, 48V, 200A
4	2	143139A	FUSE LEVER,35MM DIN MT
5	2	143149A	FUSE COVER,TAPTITE(2)12.5
6	2	148154A	FUSE, 10 AMP,TIME DELAY
7	1	148A147A	FUSE, 200A
8	11	150A130	CABLE TIE MOUNT
9	1	1612400A	LABEL, 3X2, DINRAIL, FC CNTRLS
10	1	1612403A	LABEL,GROUND SYMBOL
11	1	1612423A-82	LABEL,FC CNTL,SERIAL NUMBER
12	1	1612423A-01	LABEL,FC CNTL,DCB MODEL
13	1	161688A	LABEL, WARNING, BATTERIES
14	2	161693A	LABEL,FS LOGO
15	1	161767A	LABEL,BATTERY WARNING
16	1	161A509A	LABEL, WARNING, CNTRL
17	1	161A510A	LABEL,WARNING,BATTERY BOX
18	1	1618511A	LABEL,DANGER,BATTERY SHELF
19	1	170345D	CABINET,CONTROL,ALUMINUM
20	1	170346D	CABINET,BATTERY,ALUMINUM
21	5	229218A	BRKT,T,BLOCK END
22	8	229282A	TERM BLOCK,1-POLE,35MM DIN
23	2	229283A	CAP,END,TERM BLK,1 P.
24	2	229288A	GROUND TERM. BLOCK, 3-POS, 35MM DIN
25	1	231194A	PLUG,HOLE,1.38,SS
26	1	231298A	PLUG,HOLE,0.88" DIA
27	2	288782A	JUMPER, 20V 2.5, 1/2
28	1	288810A-04	DIN RAIL,ALUM,UNCDATED,0.400"
29	1	288810A-06	DIN RAIL,ALUM,UNCDATED,0.600"
30	10	7002A009-16	BOLT,HEX HD,SS,3/8-16 X 1
31	10	7011A067-08	SCR, PAN HD., #8 THD. FRM.
32	2	7011A081-12	SCR, PAN HD., #8 THD. FRM.
33	2	7058050A	NUT,MACH SCR,KEPS,1/4-20
34	6	7058A033	NUT,MACH SCR,KEPS,5/16-18
35	16	7058A045	NUT, KEPS, SS, 8-32
36	4	7059A063	NUT, 3/8-16
37	10	7072A035	FLT. WSHR., SS, 3/8
38	8	7074A046	LKWSHR, SPLT, SS, 3/8
39	1	8146153GA	LABEL, WARNING, HIGH VOLTAGE
40	1	8146187SB	LABEL,SIREN CONTROLLER,UL
41	1	8402136A-01	BACKPLATE, WITH 4-40 STANDOFFS & 5/16 PEMS
42	1	8402137A-01	BUSS BAR, FCT (OFFSET MODEL
43	1	84021491A-01	BRACKET,MTG,CHARGER W/PEMS
44	1	8402A066A	FUSE BLOCK ASSEMBLY
45	2	8402A068A	FITTING,1" CONDUIT,CAM,DN
46	4	8403B073C	CHARGER ASSEMBLY, 13VDC, 3A
47	1	8581025A	1" COND,LIQUI-TITE,7.5"
48	1	8600106C	CHANNEL,MTG,CABINET
49	1	8600116A	BRACKET,MTG,SWITCH,DISCONNECT
50	1 OZ	9270-08-03	ADHESIVE,RTV, 6708
51	4	7058055A	NUT, ELASTIC STOP, HEX, LIGHT,THN, 1/4-20,SS
52	6	7058065A	NUT,HEX,EXT,KEPS,3/8-16,18-8 SS
*	30	150A109	WIRE TIE
*	1	1461389A	WIRE HARNESS,BATTERY CHARGER
*	1	1461132A	WIRE LEAD,FUSE,B
*	1	146897A	WIRE LEAD,RELAY CONNECTION
*	1	1751126A-01	CABLE,BATTERY CHARGER,48VDC
*	1	1751064A-04	CABLE,AC OUTLET FOR BATT. CABINET
*	5	8568044A	MARKER,TERMINAL BLOCK
*	1	C300218-09-119	WIRE LEAD,5"
*	1	C300218-10-258	WIRE LEAD,5"
*	1	T300214-10-090	T-WIRE,6"(5/16NT-5/16NT)
*	1	T300104-02-015	T-WIRE,12"(1/2NT-1/2NT)
*	1	T300214-04-016	T-WIRE,8"(1/4NT-1/4NT)
*	1	T300422-03-060	T-WIRE,70"(1/4NT-1/4NT)
*	1	T300420-05-001	T-WIRE,89"(5/16NT-1/4NT)
*	1	T300104-10-005	T-WIRE,38"(1/2NT-1/2NT)
*	1	T300104-09-004	T-WIRE,30"(1/2NT-1/2NT)
*	2	T300104-09-001	T-WIRE,13"(1/2NT-1/2NT)
*	1	T300104-02-017	T-WIRE,38"(1/2NT-1/2NT)
**	1	255360J	MANUAL,DCB, DCFCB, & DCFCTB
**	1	8500863B	TEST DATA SHEET,ELECTRONIC
**	4	8402A070A-01	TRAY,LARGE BATTERY
**	1	8549A178A	ACCESSORY KIT,DESSICANT
**	1	8549A193A	LIGHTNING PROTECTOR
REF	0	259197A	WIRING DIAGRAM
REF	0	8500903C	TEST PROCEDURE,DCB & DCFCB
REF	0	8500113BA	INSPECTION CHECKLIST, DC
53	1	1612875A-XX	LABEL,UL ELEC RATINGS (See dwg. 1612875A for no.)

NOTES:
* 1. SHOWN ON WIRING DIAGRAM.
** 2. ITEM(S) SHIPPED IN BATTERY CABINET.
3. OPTIONAL PARTS

XXX

OPTIONAL -240B KIT

ITEM	QTY	PART NO.	DESCRIPTION
100	1	120833A	TRANSFORMER W/ INSULATOR
101	1	7002088A-72	BOLT, HEX, 3/8-16X4.5, S.S.
102	1	7072253A	WASHER, 3/8, NEOPRENE
103	2	7059A063	NUT, 3/8, S.S.
104	3	7072A035	FLAT WASHER, 3/8, S.S.
105	1	7074A046	LKWASHER, SPLIT, 3/8, S.S.
106	1	7075066A	LKWSHR, INT. TOOTH 3/8, S.S.
107	1	1612423A-81	LABEL,-240B
108	1	1612422A	LABEL, 240 VAC, REPLACES 1612400A

OPTIONAL PARTS 2001HR

ITEM	QTY	PART NO.	DESCRIPTION
109	1	131191A	RELAY,48V,SOLID STATE
*	1	1461039A	WIRE LEAD,POWER
*	1	T300218-06-031	WIRE,TERMINATED,18AWG,BLU
*	1	T300218-07-021	WIRE,TERMINATED,18AWG,VIO
*	1	T300218-10-227	WIRE,TERMINATED,18AWG,BLK

REV	CHANGE	DATE	BY
A7	SEE ECR #09-5888	12/30/09	VT
A6	SEE ECR #09-4621	4/14/09	MAF
A5	SEE ECO #08-2908	4/15/08	MAF
A4	SEE ECO #07-4087	6/18/07	VT
A3	SEE ECO #07-4067	5/16/07	MAF
A2	SEE ECO #07-4054	4/12/07	MAF
A1	SEE ECO #07-4016	1/29/07	VT
A	SEE ECO #06-4083	8/4/06	MAF

Tolerances Unless Otherwise Specified
Angles ------- ±0.5°
X.XX ------- ±0.015
X.XXX ------- ±0.005

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FINISH: N/A
REMOVE BURRS, SHARP CORNERS AND EDGES

MATERIAL: N/A
UNIT OF MEASURE: RF

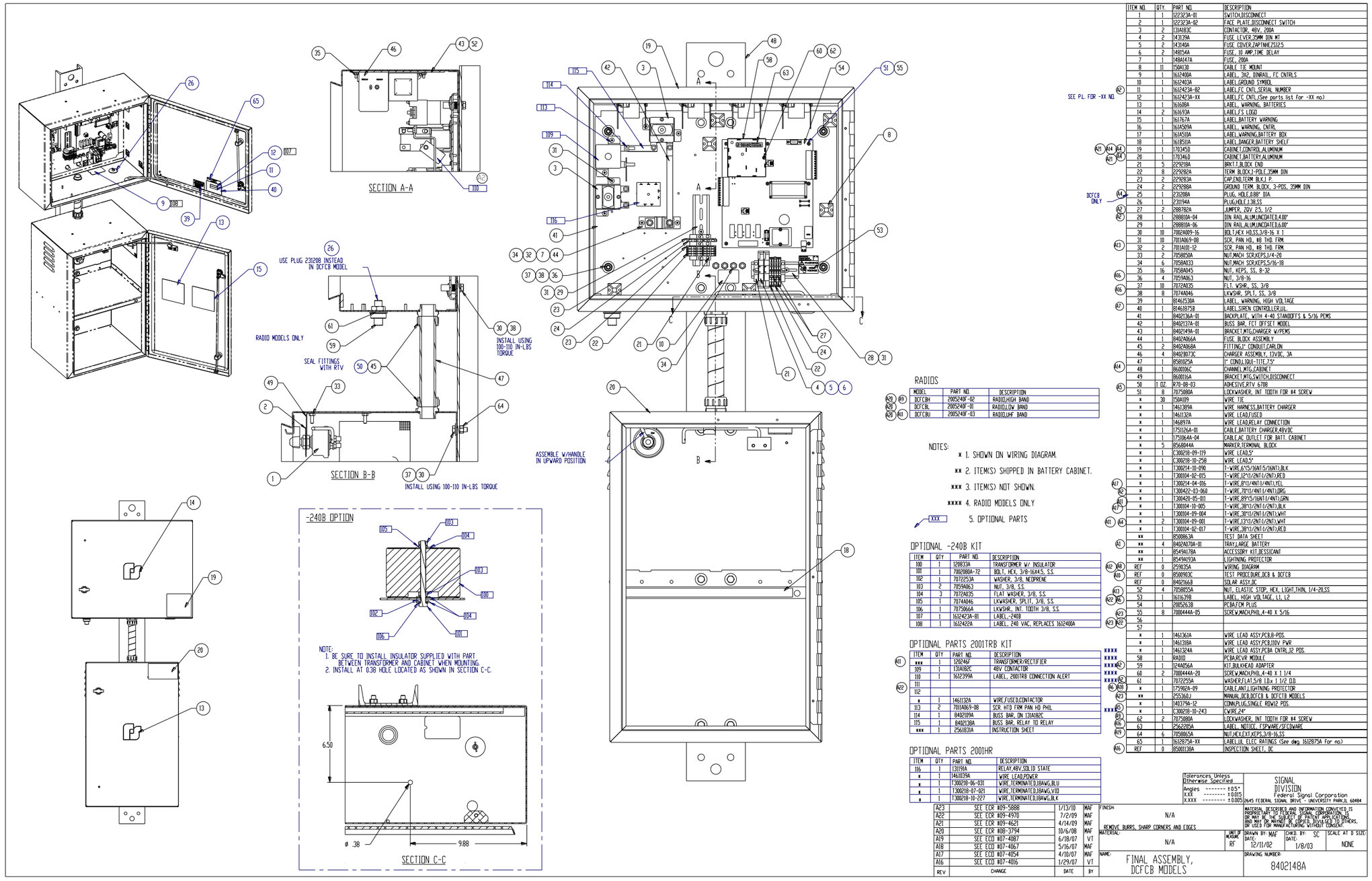
DRAWN BY: MAF DATE: 8/1/06
CHK'D BY: MJF DATE: 8/4/06
SCALE AT 8" SIZE: NONE

NAME: FINAL ASSEMBLY, DCB MODELS

DRAWING NUMBER: 8402169A

MATERIAL DESCRIBED AND INFORMATION CONVEYED IS PROPRIETARY TO FEDERAL SIGNAL CORPORATION, IS OR MAY BE THE SUBJECT OF PATENT APPLICATIONS, AND MAY BE, MAYNOT BE, COPIED, DISCLOSED TO OTHERS, OR USED FOR MANUFACTURING WITHOUT CONSENT.

Figure 29 DCFCB Final Assembly


SECTION A-A
SECTION B-B
USE PLUG 231208 INSTEAD IN DCFCB MODEL
RADIO MODELS ONLY
SEAL FITTINGS WITH RTV
INSTALL USING 100-110 IN-LBS TORQUE
ASSEMBLE W/HANDLE IN UPWARD POSITION
-240B OPTION
NOTE:
1. BE SURE TO INSTALL INSULATOR SUPPLIED WITH PART BETWEEN TRANSFORMER AND CABINET WHEN MOUNTING.
2. INSTALL AT 0.38 HOLE LOCATED AS SHOWN IN SECTION C-C.
6.50
9.88
ø .38
SECTION C-C
SEE P.L. FOR -XX NO.
DCFCB ONLY

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	122323A-01	SWITCH,DISCONNECT
2	1	122323A-B2	FACE PLATE,DISCONNECT SWITCH
3	2	131A183C	CONTACTOR, 48V, 200A
4	2	143139A	FUSE LEVER,35MM DIN MT
5	2	143140A	FUSE COVER,ZAFFINE,ZS125
6	2	148154A	FUSE, 10 AMP,TIME DELAY
7	1	148A147A	FUSE, 200A
8	11	150A130	CABLE TIE MOUNT
9	1	1612400A	LABEL, 3X2, DINRAIL, FC CNTRLS
10	1	1612402A	LABEL,GROUND SYMBOL
11	1	1612423A-B2	LABEL,FC CNTL,SERIAL NUMBER
12	1	1612423A-XX	LABEL,FC CNTL,(See parts list for -XX no.)
13	1	161608A	LABEL, WARNING, BATTERIES
14	2	161693A	LABEL,FS LOGO
15	1	161767A	LABEL,BATTERY WARNING
16	1	161A509A	LABEL, WARNING, CNTRL
17	1	161A510A	LABEL,WARNING,BATTERY BOX
18	1	161B511A	LABEL,DANGER,BATTERY SHELF
19	1	170345D	CABINET,CONTROL,ALUMINUM
20	1	170346D	CABINET,BATTERY,ALUMINUM
21	5	229218A	BRKT,T,BLOCK END
22	8	229282A	TERM BLOCK,1-POLE,35MM DIN
23	2	229283A	CAP,END,TERM BLK,1 P.
24	2	229288A	GROUND TERM BLOCK, 3-POS, 35MM DIN
25	1	231208A	PLUG, HOLE,0.88" DIA.
26	1	231194A	PLUG,HOLE1.38,SS
27	2	288782A	JUMPER, ZQV 2.5, 1/2
28	1	288810A-04	DIN RAIL,ALUM,UNSLOTTED,4.00"
29	1	288810A-06	DIN RAIL,ALUM,UNSLOTTED,6.00"
30	10	70824009-16	BOLT,HEX HD,SS,3/8-16 X 1
31	10	70114069-08	SCR, PAN HD, #8 THD. FRM
32	2	70114101-12	SCR, PAN HD, #8 THD. FRM.
33	2	7058058A	NUT,MACH SCR,KEPS,1/4-20
34	6	70584033	NUT,MACH SCR,KEPS,5/16-18
35	16	70584045	NUT, KEPS, SS, 8-32
36	4	70594063	NUT, 3/8-16
37	10	70724035	FLT. WSHR., SS, 3/8
38	8	70744046	LKWSHR, SPLT, SS, 3/8
39	1	814615306	LABEL, WARNING, HIGH VOLTAGE
40	1	814618758	LABEL,SIREN CONTROLLER,UL
41	1	84021364-01	BACKPLATE, WITH 4-40 STANDOFFS & 5/16 PEMS
42	1	84021374-01	BUSS BAR, FCT OFFSET MODEL
43	1	84021494-01	BRACKET,MTG,CHARGER W/PEMS
44	1	84024066A	FUSE BLOCK ASSEMBLY
45	2	84024068A	FITTING,1" CONDUIT,CARLON
46	4	84028073C	CHARGER ASSEMBLY, 13VDC, 3A
47	1	9581025A	1" COND,LIQUI-TITE,7.5"
48	1	9600106C	CHANNEL,MTG,CABINET
49	1	9600116A	BRACKET,MTG,SWITCH,DISCONNECT
50	1.02	9711-88-03	ADHESIVE,RTV 6788
51	8	7075088A	LOCKWASHER, INT TOOTH FOR #4 SCREW
x	30	150A109	WIRE TIE
x	1	1461389A	WIRE HARNESS,BATTERY CHARGER
x	1	146113CA	WIRE LEAD,FUSED
x	1	146897A	WIRE LEAD,RELAY CONNECTION
x	1	175112GA-01	CABLE,BATTERY CHARGER,48VDC
x	1	175106A-04	CABLE,AC OUTLET FOR BATT. CABINET
x	5	9568044A	MARKER,TERMINAL BLOCK
x	1	C308218-09-119	WIRE LEAD,5"
x	1	C308218-10-258	WIRE LEAD,5"
x	1	1308214-10-090	T-WIRE,6"(5/16NT-5/16NT),BLK
x	1	1308104-02-015	T-WIRE,12"(1/2NT-1/2NT),RED
x	1	1308214-04-016	T-WIRE,8"(1/4NT-1/4NT),YEL
x	1	1308422-03-060	T-WIRE,70"(1/4NT-1/4NT),ORG
x	1	1308420-05-011	T-WIRE,89"(5/16NT-1/4NT),GRN
x	1	1308104-10-005	T-WIRE,38"(1/2NT-1/2NT),BLK
x	1	1308104-09-004	T-WIRE,30"(1/2NT-1/2NT),WHT
x	2	1308104-09-001	T-WIRE,12"(1/2NT-1/2NT),WHT
x	1	1308104-02-017	T-WIRE,38"(1/2NT-1/2NT),RED
xx	1	8509063A	TEST DATA SHEET
xx	4	84024070A-01	TRAY,LARGE BATTERY
xx	1	8549A178A	ACCESSORY KIT,DESSICANT
xx	1	8549A193A	LIGHTNING PROTECTOR
REF	0	259035A	WIRING DIAGRAM
REF	0	8509093C	TEST PROCEDURE,DCB & DCFCB
REF	0	84021668	SCH,AR ASSY,DC
52	4	7058055A	NUT, ELASTIC STOP, HEX, LIGHT,THIN, 1/4-20,SS
53	1	161639B	LABEL, HIGH VOLTAGE, L1, L2
54	1	2005263B	PCBA,FCM PLUS
55	8	7088444A-05	SCREW,MACH,PHIL,4-40 X 5/16
56			
57			
x	1	1461361A	WIRE LEAD ASSY,PCB,8-POS.
x	1	1461318A	WIRE LEAD ASSY,PCB,110V PWR
x	1	1461324A	WIRE LEAD ASSY,PCBA CNTRL,12 POS.
58	1	9A3101	PCBA,RCVR MODULE
59	1	1244056A	KIT,BULKHEAD ADAPTER
60	2	7088444A-20	SCREW,MACH,PHIL,4-40 X 1 1/4
61	1	7072255A	WASHER,FLAT,5/8 I.D.x 1 1/2 O.D.
x	1	1729A9A-09	CABLE ANT,LIGHTNING PROTECTOR
xx	1	2553A6J	MANUAL,DCB,DCFCB & DCFCTB MODELS
x	1	140379A-12	CONN,PLUG,SINGLE ROW12 POS.
x	1	C308218-10-243	C-WIRE,24"
62	2	7075088A	LOCKWASHER, INT. TOOTH FOR #4 SCREW
63	1	2562205A	LABEL, NOTICE, FSPWARE/SFCDWARE
64	6	7058065A	NUT,HEX,EXT,KEPS,3/8-16,SS
65	1	1612875A-XX	LABEL,DC ELEC RATINGS (See dwg. 1612875A for no.)
REF	0	8508113BA	INSPECTION SHEET, DC

RADIOS

MODEL	PART NO.	DESCRIPTION
DCFCBH	2005240F-B2	RADIO,HIGH BAND
DCFCBL	2005240F-01	RADIO,LOW BAND
DCFCBU	2005240F-03	RADIO,UHF BAND

NOTES:
- x 1. SHOWN ON WIRING DIAGRAM.
- xx 2. ITEM(S) SHIPPED IN BATTERY CABINET.
- xxx 3. ITEM(S) NOT SHOWN.
- xxxx 4. RADIO MODELS ONLY
- XXX 5. OPTIONAL PARTS

OPTIONAL -240B KIT

ITEM	QTY	PART NO.	DESCRIPTION
100	1	129833A	TRANSFORMER W/ INSULATOR
101	1	7002880A-72	BOLT, HEX, 3/8-16X4.5, S.S.
102	1	70722533A	WASHER, 3/8, NEOPRENE
103	2	7059A063	NUT, 3/8, S.S.
104	3	70724035	FLAT WASHER, 3/8, S.S.
105	1	70744046	LKWASHER, SPLIT, 3/8, S.S.
106	1	7075066A	LKWSHR, INT. TOOTH 3/8, S.S.
107	1	1612423A-B1	LABEL,-240B
108	1	1612422A	LABEL, 240 VAC, REPLACES 1612400A

OPTIONAL PARTS 2001TRB KIT

ITEM	QTY	PART NO.	DESCRIPTION
A11 xxx	1	129240F	TRANSFORMER/RECTIFIER
109	1	131A183C	48V CONTACTOR
110	1	1612399A	LABEL, 2001TRB CONNECTION ALERT
111			
A22 112			
x	1	1461132A	WIRE,FUSED,CONTACTOR
113	2	7011A069-08	SCR HTD FRM PAN HD PHIL
114	1	84021019A	BUSS BAR, ON 131A183C
115	1	8402138A	BUSS BAR, RELAY TO RELAY
xxx	1	2561831A	INSTRUCTION SHEET

OPTIONAL PARTS 2001HR

ITEM	QTY	PART NO.	DESCRIPTION
116	1	131191A	RELAY,48V,SOLID STATE
x	1	1461039A	WIRE LEAD,POWER
x	1	T308218-06-031	WIRE,TERMINATED,18AWG,BLU
x	1	T308218-07-021	WIRE,TERMINATED,18AWG,VIO
x	1	T308218-10-227	WIRE,TERMINATED,18AWG,BLK

REV	CHANGE	DATE	BY
A23	SEE ECR #09-5888	1/13/10	MAF
A22	SEE ECR #09-4970	7/2/09	MAF
A21	SEE ECR #09-4621	4/14/09	MAF
A20	SEE ECR #08-3794	10/6/08	MAF
A19	SEE ECO #07-4087	6/18/07	VT
A18	SEE ECO #07-4067	5/16/07	MAF
A17	SEE ECO #07-4054	4/10/07	MAF
A16	SEE ECO #07-4016	1/29/07	VT

Tolerances Unless Otherwise Specified
Angles ------- ±0.5°
X.XX ------- ±0.015
X.XXX ------- ±0.005

SIGNAL DIVISION
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FINISH: N/A
REMOVE BURRS, SHARP CORNERS AND EDGES
MATERIAL: N/A
UNIT OF MEASURE: RF
NAME: FINAL ASSEMBLY, DCFCB MODELS

MATERIAL, DESCRIBED AND INFORMATION CONVEYED, IS PROPRIETARY TO FEDERAL SIGNAL CORPORATION, IS OR MAY BE THE SUBJECT OF PATENT APPLICATIONS, AND MAY NOT BE MADOT OR, STORED, DISCLOSED TO OTHERS, OR USED FOR MANUFACTURING WITHOUT CONSENT.

DRAWN BY: MAF DATE: 12/11/02
CHK'D BY: SC DATE: 1/8/03
SCALE: AT D SIZE: NONE
DRAWING NUMBER: 8402148A

Figure 30 DCTB-PGE Wiring

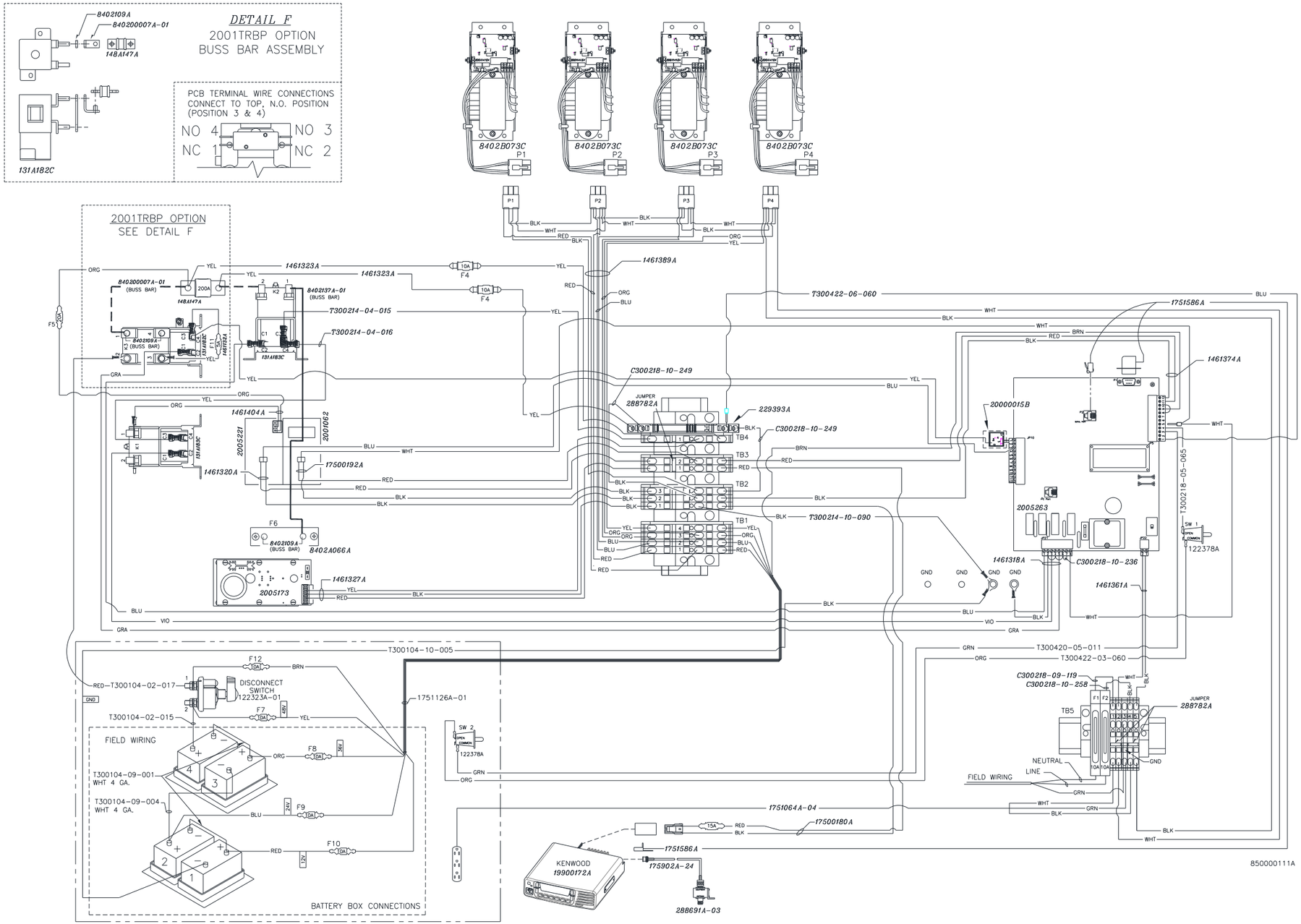
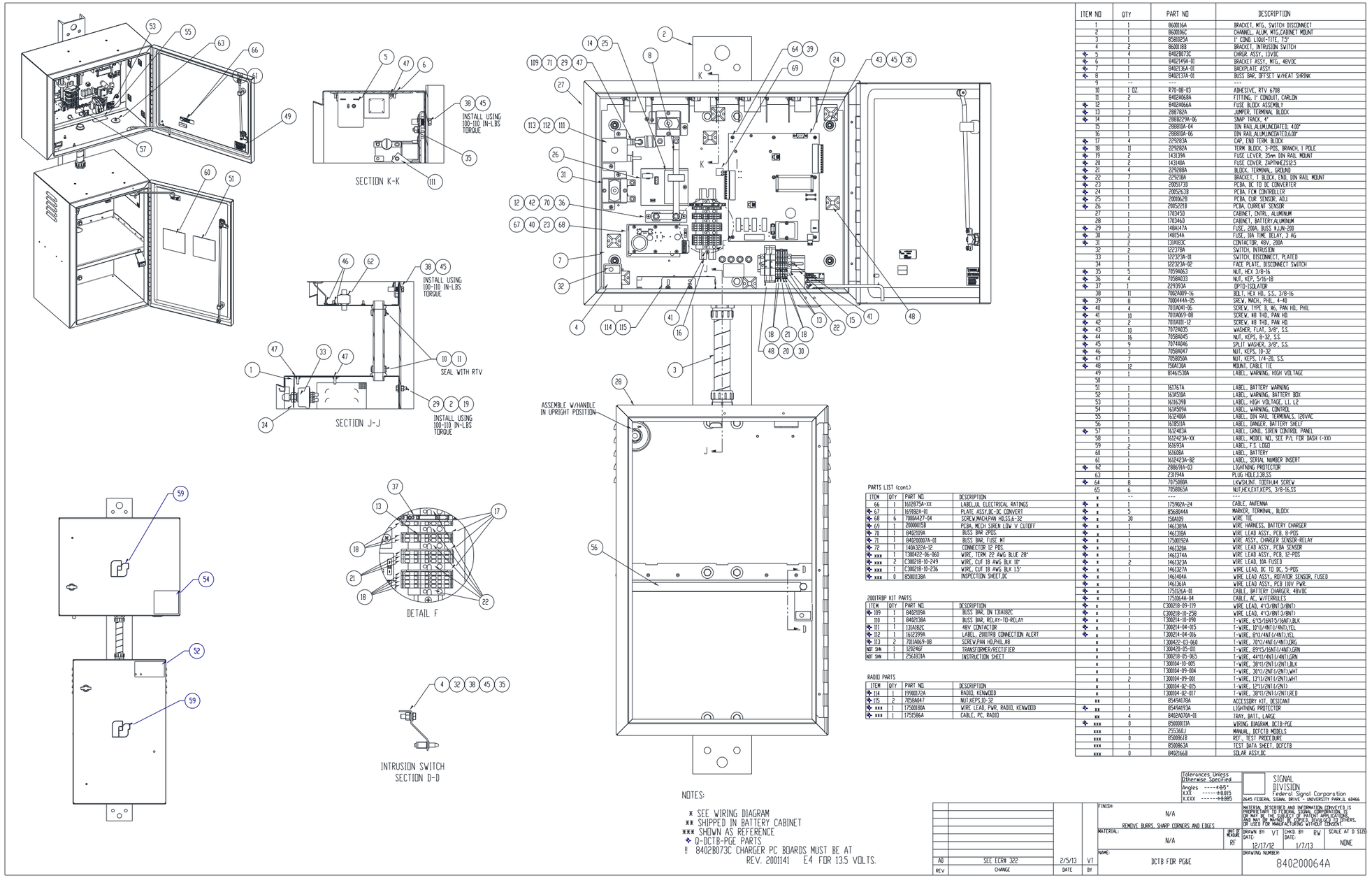


Figure 31 DCTB-PGE Final Assembly



ITEM NO	QTY	PART NO	DESCRIPTION
1	1	8600116A	BRACKET, MTG., SWITCH DISCONNECT
2	1	8601095C	CHANNEL, ALUM, MTG,CABINET MOUNT
3	1	8581025A	1" COND. LIQUI-TITE, .75"
4	2	8600108	BRACKET, INTRUSION SWITCH
❖ 5	4	8402B073C	CHRGR ASSY., 13VDC
❖ 6	1	8402149A-01	BRACKET ASSY, MTG, 48VDC
❖ 7	1	8402136A-01	BACKPLATE ASSY.
❖ 8	1	8402137A-01	BUSS BAR, OFFSET W/HEAT SHRINK
9	--	---	---
10	1 OZ.	R70-08-03	ADHESIVE, RTV 6708
11	2	8402A068A	FITTING, 1" CONDUIT, CARLON
❖ 12	1	8402A066A	FUSE BLOCK ASSEMBLY
❖ 13	3	2887B2A	JUMPER, TERMINAL BLOCK
❖ 14	1	2888229A-06	SNAP TRACK, 4"
15	1	2888810A-04	DIN RAIL,ALUMUNCIDATED, 4.00"
16	1	2888810A-06	DIN RAIL,ALUMUNCIDATED,6.00"
❖ 17	4	2292B2A	CAP, END TERM BLOCK
❖ 18	11	2292B2A	TERM BLOCK, 3-POS, BRANCH, 1 POLE
❖ 19	2	143139A	FUSE LEVER, 35mm DIN RAIL MOUNT
❖ 20	2	143140A	FUSE COVER, ZAFTANE,2102S
❖ 21	4	2292B8A	BLOCK, TERMINAL, GROUND
❖ 22	7	2292B8A	BRACKET, T BLOCK, END, DIN RAIL MOUNT
❖ 23	1	2005173J	PCBA, DC TO DC CONVERTER
❖ 24	1	2005253B	PCBA, FCN CONTROLLER
❖ 25	1	2001062B	PCBA, CUR SENSOR, ADJ
❖ 26	1	2005221B	PCBA, CURRENT SENSOR
27	1	1703415D	CABINET, CNTRL, ALUMINUM
28	1	1703416J	CABINET, BATTERY,ALUMINUM
❖ 29	1	148A147A	FUSE, 200A, BUSS #JUN-200
❖ 30	2	148154A	FUSE, 10A TIME DELAY, 3 AG
❖ 31	2	13XA182C	CONTACTOR, 48V, 200A
32	2	1227J76A	SWITCH, INTRUSION
33	1	122323A-01	SWITCH, DISCONNECT, PLATED
34	1	122323A-02	FACE PLATE, DISCONNECT SWITCH
❖ 35	5	7059A063	NUT, HEX 3/8-16
❖ 36	4	7059A033	NUT, KEP, 5/16-18
❖ 37	1	2293J3A	OPTO-ISOLATOR
38	11	7002A009-16	BOLT, HEX HD, S.S., 3/8-16
❖ 39	8	7000444A-05	SCREW, MACH, PHIL, 4-40
❖ 40	4	7011A041-06	SCREW, TYPE B, #6, PAN HD., PHIL
❖ 41	10	7011A069-08	SCREW, #8 THD., PAN HD.
❖ 42	2	7011A001-12	SCREW, #8 THD., PAN HD.
❖ 43	10	7077A025	WASHER, FLAT, 3/8", S.S.
❖ 44	16	7059A045	NUT, KEPS, 8-32, S.S.
❖ 45	9	7074A046	SPLIT WASHER, 3/8", S.S.
❖ 46	3	7059A047	NUT, KEPS, 10-32
❖ 47	7	7059B050A	NUT, KEPS, 1/4-28, S.S.
❖ 48	12	150A130A	MOUNT, CABLE TIE
49	1	8746153BA	LABEL, WARNING, HIGH VOLTAGE
50			
51	1	16176?A	LABEL, BATTERY WARNING
52	1	161A519A	LABEL, WARNING, BATTERY BOX
53	1	16116398	LABEL, HIGH VOLTAGE, L1, L2
54	1	161A529A	LABEL, WARNING, CONTROL
55	1	1612740A	LABEL, DIN RAIL TERMINALS, 120VAC
56	1	1618510A	LABEL, DANGER, BATTERY SHELF
❖ 57	1	1612403A	LABEL, GRND, SIREN CONTROL PANEL
58	1	161624?3A-XX	LABEL, MODEL NO., SEE P/L FOR DASH (-)XX)
59	2	161693A	LABEL, F.S. LOGO
60	1	161628A	LABEL, BATTERY
61	1	161624?3A-B2	LABEL, SERIAL NUMBER INSERT
❖ 62	1	2886?9A-03	LIGHTNING PROTECTOR
63	1	2311?4A	PLUG HOLE,1.38,SS
❖ 64	8	7075B08A	LKWSHLINT. TOOTH,#4 SCREW
65	6	7059B65A	NUT,HEX,EXT,KEPS, 3/8-16,SS
❖ ‡	--	---	---
❖ ‡	1	1759B24-24	CABLE, ANTENNA
❖ ‡	5	8568044A	MARKER, TERMINAL, BLOCK
❖ ‡	30	150AU99	WIRE 11E
❖ ‡	1	1461389A	WIRE HARNESS, BATTERY CHARGER
❖ ‡	1	1461388A	WIRE LEAD ASSY., PCB, 8-POS
❖ ‡	1	1750B19A	WIRE ASSY., CHARGER SENSOR-RELAY
❖ ‡	1	1461320A	WIRE LEAD ASSY., PCBA SENSOR
❖ ‡	1	1461374A	WIRE LEAD ASSY., PCB, 12-POS
❖ ‡	2	1461323A	WIRE LEAD, 15A FUSED
❖ ‡	1	1461327A	WIRE LEAD, BC TO DC, 5-POS
❖ ‡	1	1461404A	WIRE LEAD ASSY., ROTATOR SENSOR, FUSED
❖ ‡	1	1461636A	WIRE LEAD ASSY., PCB 110V PWR.
❖ ‡	1	1751264A-01	CABLE, BATTERY CHARGER, 48VDC
❖ ‡	1	1751064A-04	CABLE, AC, W/FERRULES
❖ ‡	1	C300218-09-119	WIRE LEAD, 4"(3/8NT-3/8NT)
❖ ‡	1	C300218-10-258	WIRE LEAD, 4"(3/8NT-3/8NT)
❖ ‡	1	T300214-10-098	T-WIRE, 6"(5/16NT5/16NT),BLK
❖ ‡	1	T300214-04-015	T-WIRE, 10"(1/4NT1/4NT),YEL
❖ ‡	1	T300214-04-016	T-WIRE, 8"(1/4NT-1/4NT),YEL
‡	1	T300422-03-060	T-WIRE, 70"(1/4NT1/4NT),ORG
‡	1	T300429-05-011	T-WIRE, 89"(5/16NT1/4NT),GRN
‡	1	T300218-05-065	T-WIRE, 44"(1/4NT1/4NT),GRN
‡	1	T300104-10-005	T-WIRE, 38"(1/2NT1/2NT),BLK
‡	1	T300104-09-004	T-WIRE, 30"(1/2NT1/2NT),WHT
‡	2	T300104-09-003	T-WIRE, 13"(1/2NT1/2NT),WHT
‡	1	T300104-02-005	T-WIRE, 12"(1/2NT1/2NT)
‡	1	T300104-02-017	T-WIRE, 38"(1/2NT1/2NT),RED
‡‡	1	8549A178A	ACCESSORY KIT, DESIGANT
❖ ‡‡	1	8549A153A	LIGHTNING PROTECTOR
‡‡	4	8402A070A-01	TRAY, BATT., LARGE
❖ ‡‡‡	0	850000111A	WIRING DIAGRAM, DCTB-PGE
‡‡‡	1	2553601J	MANUAL, DCTCTB MODELS
‡‡‡	0	8508861B	REF., TEST PROCEDURE
‡‡‡	1	8508863A	TEST DATA SHEET, DCTCTB
‡‡‡	0	8402166B	SOLAR ASSY.DC

PARTS LIST (cont)

ITEM	QTY	PART NO.	DESCRIPTION
66	1	1619875A-XX	LABEL,UL ELECTRICAL RATINGS
❖ 67	1	1619824-01	PLATE ASSY,DC-DC CONVERT
❖ 68	6	7000A427-04	SCREW,MACH,PAN HD,SS,6-32
❖ 69	1	2000005B	PCBA, MECH SIREN LOW V CUTOFF
❖ 70	1	8402109A	BUSS BAR 2POS.
❖ 71	1	8402B007A-01	BUSS BAR, FUSE MT
❖ 72	1	140A322A-12	CONNECTOR 12 POS.
❖ ‡‡‡	1	T300422-06-060	WIRE, TERM 22 AWG BLUE 28"
❖ ‡‡‡	2	C300218-10-249	WIRE, CUT 18 AWG BLK 10"
❖ ‡‡‡	1	C300218-10-236	WIRE, CUT 18 AWG BLK 15"
❖ ‡‡‡	0	8500013BA	INSPECTION SHEET,DC

2001TRBP KIT PARTS

ITEM	QTY	PART NO.	DESCRIPTION
❖ 109	1	8402109A	BUSS BAR, CN 13XA182C
110	1	8402138A	BUSS BAR, RELAY-TO-RELAY
❖ 111	1	13XA182C	48V CONTACTOR
❖ 112	1	1612399A	LABEL, 2001TRB CONNECTION ALERT
❖ 113	2	7011A069-08	SCREW,PAN HD,PHIL,#8
NOT SHN	1	1252146F	TRANSFORMER,RECTIFIER
NOT SHN	1	2561831A	INSTRUCTION SHEET

RADIO PARTS

ITEM	QTY	PART NO.	DESCRIPTION
❖ 114	1	1990072A	RADIO, KENWOOD
❖ 115	2	7058A047	NUT,KEPS,10-32
❖ ‡‡‡	1	1750018BA	WIRE LEAD, PWR, RADIO, KENWOOD
❖ ‡‡‡	1	1751586A	CABLE, PC, RADIO

NOTES:

‡ SEE WIRING DIAGRAM
‡‡ SHIPPED IN BATTERY CABINET
‡‡‡ SHOWN AS REFERENCE
❖ Q-DCTB-PGE PARTS
‼ 8402B073C CHARGER PC BOARDS MUST BE AT REV. 2001141 E.4 FOR 13.5 VOLTS.

REV	CHANGE	DATE	BY
A0	SEE ECR# 322	2/5/13	VT

Tolerances Unless Otherwise Specified
Angles ----- ±0.5°
X.X ----- ±0.015
XXXX ----- ±0.005

SIGNAL DIVISION
Federal Signal Corporation
2645 FEDERAL SIGNAL DRIVE - UNIVERSITY PARK,IL 60466

FINISH: N/A
REMOVE BURRS, SHARP CORNERS AND EDGES
MATERIAL: N/A
UNIT OF MEASURE: RF
NAME: DCTB FOR PG&E
DRAWN BY: VT DATE: 12/17/12
CHKD. BY: RW DATE: 1/7/13
SCALE: AT D SIZE: NONE
DRAWING NUMBER: 840200064A

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Glossary

Term	Description
AC	Electric Alternating Current occurs when charge carriers in a conductor or semi-conductor periodically reverse their direction of movement. For sirens, this is provided by landline power.
AR Timer	Activating control for Model 2 and STH10
AWG	American Wire Gauge is a United States standard set of non-ferrous wire conductor sizes
BCD	Binary Coded Decimal, a format for representing decimal numbers in which each digit is signified by four bits
CD	Carrier Detect – an indication that an RF carrier is present
CPU	Central Processing Unit
dBC	dB = Decibel, a standard for measuring sound pressure level. C = C weighted filtering
DC	Directional Current is the unidirectional flow or movement of electric charge carriers. For sirens, this is provided by battery power.
DMM	Digital Multi-Meter
DSA	Directional Speaker Array type of electronic siren
DTMF	Dual-Tone Multi-Frequency, an analog communications technology
EAS	Emergency Alert System
ECLIPSE8	Omni-directional DC siren with horns
ECLIPSENH	Omni-directional DC siren with no horns
Ethernet	A physical and data link layer technology for local area networks
FC	Federal Controller
FCDS	Federal Commander Digital System
FCT	Federal Controller Two-way
FEMA	Federal Emergency Management Association
FSK	Frequency Shift Keying, a digital communications technology
FSPWARE	Federal Signal Programmer Software
IAEM	International Association of Emergency Managers
IC	Integrated Circuit
IP	Internet Protocol
LED	A semiconductor device that emits visible light when an electric current passes through it.
Low Band	Low frequency end of the VHF band, 30-50 MHz
MOD	Modulator electronic siren
Model 2	Omni-directional mechanical siren
MOSCAD	Motorola SCADA System
MSK	Minimal Shift Keying – a form of FSK
NEMA	National Emergency Managers Association
Ohm	Standard International (SI) measurement of electrical resistance
Omni Antenna	An antenna with a non-directional pattern on the given plane of the antenna, and a directional pattern in any orthogonal plane
PCB	Printed Circuit Board
PTT	Push to Talk
RF	Radio Frequency
RME	Eclipse roof mounting plate
ROW	Right Of Way
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition

Term	Description
SFCDWARE	Federal Commander Digital System software package
SINAD	Signal to noise and distortion ratio
SS2000	One-way or two-way digital encoder
STH10	Mechanical omni-directional siren
UHF	Ultra High Frequency ranging from 450 MHz to 470 MHz for most applications
UL	Underwriters Laboratories Inc.
UltraVoice	Electronic siren controller
VAC	Standard measurement of horsepower, Volts AC current
VDC	Standard measurement of horsepower, Volts for DC current
VHF	Very High Frequency ranging from 150 MHz to 174 MHz for most applications
VSWR	Voltage Standing Wave Ratio
Yagi Antenna	Unidirectional antenna with gain (amplification)
2001-130	2001 Electro-mechanical siren

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Yagi Antenna Installation 60

2645 Federal Signal Drive, University Park, IL 60484-3167
Phone: 800-524-3021
E-mail: techsupport-ans@federalsignal.com
Website: http://www.alertnotification.com